4TH ANNUAL

URBAN ECOLOGY & CONSERVATION SYMPOSIUM

Fostering Science and Nature in the City

Organized by the
Urban Ecosystem Research Consortium (UERC)

Held at
University Place, Portland State University
Portland, Oregon, USA
January 27, 2006

TABLE OF CONTENTS

SYMPOSIUM SPONSORS

AUDUBON SOCIETY OF PORTLAND
5151 NW Cornell Rd
Portland OR 97210
(503) 292-6855

CITY OF PORTLAND
Bureau of Environmental Services
1120 SW 5th Avenue, Rm 100
Portland, OR 97204
(503) 823-7740

METRO
600 NE Grand Ave.
Portland, OR 97232-2736
(503) 797-1700

URBAN GREENSPACES INSTITUTE
Mike Houck
PO Box 6903
Portland, OR 97228
houckm@teleport.com

LEWIS & CLARK COLLEGE*
0615 SW Palatine Rd.
Portland, OR 97219
(503) 768-7000

*The UERC strives to foster students' knowledge of our urban ecosystem through subsidizing student attendance. The UERC symposium registration fees are calculated to meet costs. Lewis and Clark College contacted the UERC to ask if an entire class could attend the annual symposium and offered to help financially if this created any hardship. The UERC estimated the actual cost of attendance per person (student or non-student), and Lewis and Clark increased student registration fees to cover that cost. If you are interested in a similar arrangement for classes attending future symposia, please contact one of the symposium organizers.

Program printed courtesy of Metro
We thank Kori Jacobs and Corie Harlan for their assistance with this program and Melissa Kennedy for her assistance with registration

ABOUT THE
URBAN ECOSYSTEM RESEARCH CONSORTIUM

Mission Statement

To advance the state of the science of urban ecosystems and improve our understanding of them, with a focus on the Portland-Vancouver metropolitan region, by fostering communication and collaboration among researchers, managers, and citizens at academic institutions, public agencies, local governments, non-profit organizations, and other interested groups.

Primary UERC activities include:

- Organizing annual Urban Ecology and Conservation symposia
- Coordinating working group meetings
- Maintaining a contact list for networking
- Providing a web site to enable access to UERC-related information
- Hosting a listserv for participants to communicate

Advocacy Statement

The role of the UERC is not to provide a political or advocacy platform, but to offer a forum for professionals to exchange information regarding urban ecology and its application to resource planning and management.

Peer Review Committee

The UERC Peer Review Committee meets three times a year (fall, winter, spring) to provide feedback to people working on urban ecology projects, proposals, and research (including master's theses). The next meeting is scheduled for February/March.

Past presenters at the committee included graduate students, private land owners, and park districts. A typical meeting lasts about 2 hours and consists of one or two short presentations, often accompanied by a written document, followed by a constructive discussion of the how to improve or modify the project.

If you have a project or proposal for review, please contact Bruce Barbarasch at (503) 629-6305 x2950 or nature@thprd.org. He will schedule a time, date, and location with you and the committee.

Listserve

Join the listserv hosted by Oregon State University to exchange information and receive notices about upcoming events by subscribing at lists.oregonstate.edu/mailman/listinfo/urban-erc.

Find Out More

For more information about the UERC and to find out how you can get involved, please visit the web site hosted by Portland State University at www.esr.pdx.edu/uerc or contact a steering committee member.

UERC Steering Committee

The steering committee oversees UERC activities and organizes the Urban Ecology and Conservation symposia. Currently, the steering committee is composed of 12 individuals representing academic institutions, government agencies, and non-profit organizations. This diverse representation allows us to reach into many important sectors of the natural resources community in the Portland-Vancouver metropolitan area. If you are interested in joining this committee, please get in touch with any of the members listed below.

Jennifer Budhabhatti
Metro Regional Parks and Greenspaces
600 NE Grand Ave
Portland, Oregon 97232
(503) 797-1876
budhabhattij@metro.dst.or.us

Josh Caplan
Environmental Science
Portland State University
PO Box 751
Portland OR 97207
(503) 725-4983
jcaplan@pdx.edu

Amy Chomowicz
City of Portland, Environmental Services
1120 SW 5th Avenue, Rm 1000
Portland, OR 97204
(503) 823-5323
amyc@bes.ci.portland.or.us

Lori Hennings
Metro Nature in Neighborhoods
600 NE Grand Ave
Portland, OR 97232
(503) 797-1940
hennings@metro.dst.or.us

Mike Houck
Urban Greenspaces Institute
PO Box 6903
Portland, OR 97228
(503) 319-7155
houckm@teleport.com

Paul Ketcham
Metro Long Range Planning
600 NE Grand Ave.
Portland, OR 97232
(503) 797-1726
ketcham@metro.dst.or.us

Stephen Metzler
EarthWorks
2151 NW Johnson St, #214
Portland, OR 97210
(503) 419-7859
stephenmetzler@comcast.net

Noelwah Netusil
Department of Economics
Reed College
3203 SE Woodstock Blvd
Portland, OR 97202
(503) 517-7306
netusil@reed.edu

Elizabeth Safran
Geological Science
Lewis and Clark College
Portland, OR 97219
(503) 768-7690
safran@lclark.edu

Bob Sallinger
Audubon Society of Portland
5151 NW Cornell Rd
Portland, OR 97210
(503) 292-9501 x122
bsallinger@audubonportland.org

Jennifer Thompson
U.S. Fish and Wildlife Service
2600 SE 98th Ave, Suite 100
Portland, Oregon 97266
(503) 231-6179
jennifer_thompson@fws.gov

Alan Yeakley
Environmental Science
Portland State University
PO Box 751
Portland OR 97207
(503) 725-8040
yeakley@pdx.edu

SYMPOSIUM AGENDA

8:00	Registration		
9:00	Welcome & Introduction: Lori Hennings		
9:10	Keynote Address: Mike Burton		

Community Connections

Moderator: Jennifer Thompson

9:40	Geddes, Janelle	Metro	Nature in Neighborhoods - Metro's Grant Program and Local Capacity
9:50	Hennings, Lori	Metro	Need Data? Want to Know about Restoration Sites? Join Metro's Interactive Mapping Web Tool!
10:00	Zonick, Curtis	Metro	A Regional Volunteer Wildlife Monitoring Program Using Birds and Amphibians to Assess Habitat Restoration
10:10	Larson, Kelli	Arizona State University	Attitudes toward Water Resource Protection: Differences between Participants and Non-Participants of Place-based Groups
10:20	Hosty, Maureen	OSU Extension 4-H	Advancing the Science of Urban Ecosystems along the Urban-Rural Interface
10:30	Q&A		
10:40	Break - *Raffle at 10:55*		

Conservation Approaches

Moderator: Liz Safran

11:00	Berger, Chris	Portland State University	Columbia Slough Water Quality Model
11:10	Perry, Kevin	City of Portland	Portland's Green Street Stormwater Solutions
11:20	Uchiyama, Dawn	City of Portland	Actions for Watershed Health: 2005 Portland Watershed Management Plan
11:30	Labbe, Jim & Radin, Kenneth	Audubon Society of Portland	Nature in your Neighborhood? Access to Public Parks and Nature in the Portland Metro-Region
11:40	Triplett, Stacey	Metro	Natural Area Acquisition as Successful Strategy: Continuation of Metro's Program
11:50	Q&A		
12:00	Lunch - *Raffle at 12:55*		
1:00	Keynote Address: John Marzluff		

Fish, Wildlife & Habitat

Moderator: Paul Ketcham

1:30	Emmerson, Kendel	Mason, Bruce & Girard, Inc	Peregrine Falcon Nest Monitoring and Management during the St. John's Bridge Rehabilitation Project
1:40	Smith, Sarah	Portland State University	The Source-sink Dynamics of Spotted Towhees in Urban Greenspaces
1:50	Casey, Alexis	Mason, Bruce & Girard, Inc	Wildlife Hot Spots along Highways in Northwestern Oregon
2:00	Scholz, Nathan	NOAA Fisheries	Impacts of Stormwater Runoff on Coho Salmon in Restored Urban Streams
2:10	Thompson, Ry & Studebaker, Cindy	City of Portland	Off-channel Habitat Restoration in Floodplain Wetlands: A Case Study from the Lower Columbia Slough
2:20	Klock, Clair	Clackamas Soil & Water Conserv District	Golf Course Quality Lawns - "Microwatersheds": Reducing Fertilizer and Pesticides in Urban Surface and Goundwater
2:30	Opila, Frank	Jackson Bottom Wetlands Preserve	Comparison of Water Quality Data from the Tualatin River and a Wetland Floodplain
2:40	Q&A		
2:50	Break - *Raffle at 3:05*		

Urban Forestry

Moderator: Bob Sallinger

3:10	Stevens, Wendy; Raup, Alexander; Frisby, Cameron; & Stauth, Gabriel	Portland State University	School-Community Partnerships in Conservation: Restoration and Monitoring of Forest Habitat at Oaks Bottom Wildlife Refuge by Winterhaven Middle School
3:20	Durocher, Ryan	City of Vancouver	Utilizing LiDAR Data to Analyze the Urban Forest Canopy in Vancouver, Washington
3:30	Poracsky, Joseph	Portland State University	Portland's Urban Forest Canopy and Street Trees
3:40	Oleyar, David	University of Washington	Evaluating Urban Forest Functionality: A Three Dimensional Approach
3:50	Barbarasch, Bruce	Tualatin Hills Park & Rec District	Effects of Surrounding Land Use on Plant Species Composition in Urban Forest Fragments
4:00	Geiser, Linda	USDA Forest Service	Atmospheric Deposition Inputs and Effects on Lichen Chemistry and Communities in the Columbia River Gorge
4:10	Ory, Jill	Clean Water Services	The Tree Planting Challenge
4:20	Q&A		
4:30	Wrap Up: Mike Houck		
4:40-6:30	Poster Session & Social		

POSTER PRESENTATIONS

Annear, Robert & Wells, Scott	Lower Clackamas River Temperature Model
Annear, Robert *et al.*	Willamette River System Temperature Waste Load Allocation Model
Atkinson, Dean & Wright, Monica	Real Time Measurements of Diesel Particulate Matter Optical Properties Using a Cavity Ring-Down Transmissomiter
Barbarasch, Bruce & Reilly, Julie	Quantifying Natural Resources Maintenance Costs
Bash, Jeff *et al.*	Increasing the Ability of "Friends" Groups to Restore and Sustain Urban Natural Areas in Seattle
Boeder, Michael	Oxygen Dynamics, Land Cover Change, and Urban Runoff Management in the Rock Creek Basin, OR
Broshot, Nancy *et al.*	Mammalian Predation on Western Red Cedar (*Thuja plicata*) Seedlings in an Urban Forest
Castro, Janine	PSU Professional River Restoration Certificate Program Provides Team-Based Training to Watershed Professionals
Curry, Tierra & Murphy, Michael	Impacts of Water-control Structures on Native Amphibians and Invasive Bullfrogs
McKay, Jenny *et al.*	A Video Survey of Parental Feeding Behavior in the Spotted Towhee (*Pipilo maculatus*)
Newberry, Kerry	Public Education: From Vine to Table, An Ethnographic Study of Sustainability in the Willamette Valley
Norred, Jon & Chang, Heejun	Seasonal Variation in Stream Response to Storm Events in Fanno Creek
O'Day, Terry *et al.*	The B-Street Sustainability Project
Page, Leah & Kling, David	Economic Benefits of Riparian Restoration: Portland's Fanno Creek Watershed
Parra, Jeremy & George, Linda	Increasing the Utility of Ubiquitous Urban Rooftop Meteorological Measurements for Air Pollution Modeling
Pennington, Toni & Sytsma, Mark	Biology of *Egeria densa* in Western Waterways
Pennington, Toni *et al.*	Oregon Lakes Association: A Voice for Quiet Waters
Scheuer, Kif	Adoption of Green Practices Among Residential Builders: The Role of Familiarity
Schmidt, Mary Ann	Working to Engage Oregon Students with Their Home Waters through Community-Based Inquiry Science
Senkyr, Lauren	Riparian Habitat Analysis: Science and Policy
Simkanin, Christina *et al.*	Assessing Shipping Vectors of Aquatic Nonindigenous Species to the Lower Columbia River
Sinclair, Marcia	Building an Ecosystem Marketplace for the Willamette River Basin
Steiner, Claire *et al.*	Effect of Urbanization on Soil Temperatures in the Portland Metropolitan Area
Stewart, Elaine	Comparison of Bird Communities With and Without Human Disturbance in an Urban Natural Area
Stewart, Elaine & Kimpo, Angie	Re-conversion of Agricultural Land to Wildlife Habitat near Forest Grove
Webb, William & DeLap, Jack	Wildlife in the City: Use of Wildlife Injury Data to Explore Human-Wildlife Relationships
Williams, Dilafruz & Parajuli, Pramod	Urban Learning Gardens Laboratory: A Collaboration Model for K-8 Academic Performance, Health, and Multiculturalism
Yeakley, Alan & Ozawa, Connie	Changes in Riparian Vegetation Buffers in Three Oregon Cities from 1990 to 2002
Zonick, Curtis	Development of a Regional Weed Mapping System Using False Brome (*Brachypodium sylvaticum*) as a Model

KEYNOTE SPEAKERS

Opening Keynote Address

Is it 'The Death of Environmentalism' or Re-framing the Question?

Michael Burton
School of Extended Studies, Portland State University

Michael Burton has been Vice Provost and Dean of the School of Extended Studies at Portland State University since 2004. Prior to coming to Portland State, Burton was the Executive Officer for the Portland regional metropolitan government from 1995-2003. In that capacity, he led the regional government's efforts to contain urban sprawl and the planning efforts to insure the natural environment would be protected. Mike was also responsible for implementing the region's open space and trails ballot measure.

Mike was a member of the Oregon House of representatives for five terms and served as Speaker Pro Tem. He served as the first presiding officer of the Metro council and also was a member of Governor Bob Straub's staff. On the national level, Mike was a member of the Northwest Council for the President's Council on Sustainability, was a board member for The Heinz Center for Science, Economics & the Environment's study *The State of the Nation's Ecosystems*, and served as an Oregon delegate to the International Symposium on Transportation and Air Quality sponsored by the German Marshall Fund.

Luncheon Keynote Address

Is Urbanization for the Birds?

John Marzluff
College of Forest Resources, University of Washington

John Marzluff is Professor of Wildlife Science at the University of Washington. He also holds the Denman Chair in Sustainable Resource Sciences and directs the Urban Ecology Program at UW. His current research brings this behavioral approach to pressing conservation issues including raptor management, management of pest species, and assessment of nest predation. His recent book, *In the Company of Crows and Ravens* (with Tony Angell) blends biology, conservation, and anthropology to suggest that human and crow cultures have co-evolved. John has led studies on the effects of military training on falcons and eagles in southwestern Idaho, the effects of timber harvest, recreation, and forest fragmentation on goshawks and marbled murrelets in western Washington and Oregon, conservation strategies for Pacific Island crows, and the effects of urbanization on songbirds in the Seattle area.

John has authored over 100 scientific papers on various aspects of bird behavior and wildlife management. He has edited *Avian Conservation: Research and Management*, *Avian Conservation and Ecology in an Urbanizing World*, and *Radiotelemetry and Animal Populations*. He is currently leader of the U.S. Fish and Wildlife Service's Recovery Team for the critically endangered Mariana Crow. He is an Elected Member of the American Ornithologist's Union and currently serves on the board of the Cooper Ornithological Society.

ABSTRACTS SUBMITTED

Annear, Robert L.[1] and Wells, Scott A.

Department of Civil & Environmental Engineering, Portland State University
PO Box 751, Portland, OR 97207
[1]Phone: (503) 725-3048, Fax: (503) 725-5950, Email: annearr@cecs.pdx.edu

Lower Clackamas River Temperature Model

A hydrodynamic and water quality model of the Lower Clackamas River was developed to evaluate temperature in the river for the Willamette River main stem system as part of the watershed temperature TMDL. Additional work has been focusing on improving the model calibration and understanding of interaction of surface withdrawals in the Lower Clackamas River and their effects on stream temperature. The Lower Clackamas River watershed is located in Northwest Oregon and drains 2,400 km2 consisting of forested, agricultural, and urban lands. The water quality model was developed for the Clackamas River from the Rivermill Reservoir Dam (Estacada Lake, RM 22.6) downstream to the river's confluence with the Lower Willamette River. Inflows include large tributaries, point and non-point sources. Outflows include both municipal and agricultural withdrawals. CE-QUAL-W2 Version 3 is a two-dimensional water quality and hydrodynamic model capable of modeling watersheds with interconnected rivers, reservoirs and estuaries and accounts for the impact of riparian vegetative and topographic shading on stream temperature. The model was re-calibrated for the summers of 2001 and 2002 with additional model simulations run for 2000 to 2005. Hydrodynamics were calibrated first followed by temperature. The model was used to investigate the impact of various withdrawal scenarios on river temperatures.

Keywords: Water Quality, Land/Watershed Management, Sustainable Development
Time period: 2005
Geographic Location: Clackamas River Basin, OR
Partners and Sponsors: Clackamas Watershed Management Group

Annear, Robert L. [1], Berger, Christopher J.; Wells, Scott A.

Department of Civil & Environmental Engineering, Portland State University
PO Box 751, Portland, OR 97207
[1]Phone: (503) 725-3048, Fax: (503) 725-5950, annearr@cecs.pdx.edu

Willamette River System Temperature Waste Load Allocation Model

A hydrodynamic and water quality model of the Willamette River main stem system was developed to evaluate temperature waste load allocations as part of the watershed temperature TMDL. The Willamette River watershed is located in Oregon and drains 29,800 km^2 consisting of forested, agricultural, and urban lands. Inflows include major tributaries, point and non-point sources. CE-QUAL-W2 Version 3 is a two-dimensional water quality and hydrodynamic model capable of modeling watersheds with interconnected rivers, reservoirs and estuaries and accounts for the impact of riparian vegetative and topographic shading on stream temperature. The model domain includes the Willamette River (300 km), 7 large tributaries up to their flood control reservoirs (710 km), and part of the Lower Columbia River (146 km). Modeling the Columbia River was necessary to simulate tidal fluctuations and influxes of Columbia River water into the Lower Willamette River. The model was calibrated for the summers of 2001 and 2002. Hydrodynamics were calibrated first followed by temperature. The model was used to investigate the impact of various point and non-point source scenarios on river temperatures and to predict temperatures evaluating potential vegetative shade characteristics.

Keywords: Water Quality, Land/Watershed Management, Fisheries
Time period: 2001 - 2004
Geographic Location: Willamette River Basin and Lower Columbia River Basin, OR
Partners and Sponsors: Oregon Department of Environmental Quality

Atkinson[1], Dean and Wright, Monica[2]

Chemistry Department - Atkinson Lab, Portland State University
PO Box 751, Portland, OR 97207
[1]E-mail: atkinsond@pdx.edu
[2]Phone: (503) 804-7484, Email: wrightm@pdx.edu

Real Time Measurements of Diesel Particulate Matter Optical Properties Using a Cavity Ring-Down Transmissomiter

A growing number of studies indicate that people who live in neighborhoods that are near highways or other high traffic areas have significantly higher health risks due to inhalation of Diesel Particulate Matter (DPM). Diesel particulate matter is particularly harmful because of its size distribution, morphology and chemical properties. More than 50% of the cancer risk due to air toxics in Portland, OR is due to exposure to DPM according to EPA model estimates. However, using conventional aerosol monitoring instruments, actual measurements of DPM levels is difficult due the challenge of isolating DPM from other particulate matter in polluted air. Our real-time instrument, which employs both the Cavity Ring-Down technique and a commercially available nephelometer, is capable of effectively assessing DPM levels by measuring the optical properties of air. Taking the difference between the extinction and scattering yields a measure of the absorption characteristic of the sampled air. The single scattering albedo, an intensive measurement of the blackness of a particle, can also be determined. Given that diesel exhaust is known to contain small, highly absorbing nanoparticles, we expect that the measurement of absorption should be highly correlated with DPM concentrations, while the single scattering albedo should be useful in following the mixing/dilution of the DPM as the distance from the source is increased. Validation studies and recent results from an air measurement campaign in North Portland, Oregon suggest good correlation between our measurements and expected DPM levels.

Keywords: Air Quality, Environmental Policy, Transportation.
Geographic Location: North Portland, OR
Partners and Sponsors: EPA

Barbarasch, Bruce

Tualatin Hills Park & Recreation District, Natural Resources Department
5500 SW Arctic Dr. #2, Beaverton, OR 97006
Phone: (503) 629-6305 x2950, E-mail: bbarbara@thprd.com

Effects of Surrounding Land Use on Plant Species Composition in Urban Forest Fragments

As human development occurs in forested areas, forests become fragmented into small islands in a matrix of urban land uses. This study examined the effect of surrounding urban land uses on the native and exotic plant species found on the edges of forest fragments in the Portland, OR metropolitan region. A total of twenty four forest edges in three land use categories (field, residential, road) were used in the study which took place between mid-June and mid-August of 2004 and 2005. Edges were sampled for cover and richness using line intercept transects, run perpendicular to the forest edge. Measures of canopy cover, slope, aspect, edge age, and surrounding land use were made. Analyses of variance and covariance tests were used to examine the effect of variables and to determine if there were significant differences between land use categories and distribution of plants within transects. It was found that road edges had significantly higher native cover than field or residential edges which were statistically the same. Three exotic species (English ivy, Himalaya blackberry, and non-native cherry) accounted for nearly 75% of the exotic cover. As road edges aged, native species richness increased. However, native richness decreased on field and residential edges over time. Exotic richness increased at all sites over time. Increasing interior canopy cover in residential and road edges led to a rise in exotic cover and richness, suggesting an increase in shade tolerant exotic plants. Land managers should be aware that surrounding land uses can impact forest communities: the results of this study show that while roads may have detrimental effects on native plant communities, other urban land uses may have greater negative impacts.

Keywords: Conservation Biology, Land/Watershed Management, Plant Ecology
Time period: mid-June - mid-August, 2004 and 2005
Geographic Location: Portland metropolitan area
Partners and Sponsors: Mitch Cruzan, Joe Maser, Portland State University

Barbarasch, Bruce[1] and Reilly, Julie[2]

Natural Resources Department, Tualatin Hills Park & Recreation District
5500 SW Arctic Drive, Suite 2, Beaverton, OR 97005
[1] Phone: (503) 629-6305 x2950, Email: bbarbara@thprd.org
[2] Phone: (503) 629-6305 x2951, Email: jreilly@thprd.org

Quantifying Natural Resources Maintenance Costs

Although it is generally understood that urban natural areas require maintenance, it is difficult to create an effective yearly budget to address the expected costs associated with such activities. Using Excel and time standards from physical asset maintenance programs, the Natural Resources Department of Tualatin Hills Park & Recreation District is creating maintenance management plans for natural area parks in order to predict the labor costs for appropriate restoration and preservation.

Keywords: Conservation Biology, Habitat Restoration, Land/Watershed Management
Time period: 2004 - 2006
Geographic Location: Washington County, City of Beaverton, OR

Bash, Jeff [1]; Elman, Ella; Salisbury, Nelson

Seattle Urban Nature Project
5218 University Way NE, Seattle, WA 98105
[1]Phone: 206 522-0334, Email: jeff@seattleurbannature.org

Increasing the Ability of "Friends" Groups to Restore and Sustain Urban Natural Areas in Seattle

For the past two years, Seattle Urban Nature Project has worked with local community groups who provide stewardship for urban parks and green spaces in the Seattle area. These "Friends" groups organize volunteer work parties and conduct maintenance and restoration in local parks. The groups also involve the greater community through outreach and educational activities within the local forests. Seattle Urban Nature Project helps local groups by:

- Providing scientific information and expertise through conducting vegetation surveys and writing vegetation management plans for parks
- Providing GIS surveying and mapping for groups without technical expertise
- Working with volunteers to create vegetation monitoring protocols
- Providing community outreach and education about the value of local parks

Seattle Urban Nature Project is currently involved in two collaborative projects with the Friends of Deadhorse Canyon and the Friends of Llandover Woods. These projects are documenting both the social and ecological resources in and around Deadhorse Canyon and Llandover Woods in order to increase support for restoration efforts in these urban natural areas, strategically guide restoration activities here, and train local volunteers in monitoring methods. This poster presents information about these projects and the approach the groups are taking to map community assets and develop an effective monitoring plan.

Keywords: Environmental Education, Habitat Restoration, Plant Ecology
Time period: 2004 - 2006
Geographic Location: Seattle, WA
Partners and Sponsors: Friends of Deadhorse Canyon, Friends of Llandover Woods, King County, Washington Department of Natural Resources, USDA Forest Service, Seattle Public Utilities
Publications: Deadhorse Canyon (Lakeridge Park) Vegetation Management Plan, 2005. Seattle Urban Nature Project, Seattle.

Berger, Christopher J. [1] and Wells, Scott A.

Department of Civil & Environmental Engineering, Portland State University
PO Box 751, Portland, Oregon 97207
[1]Phone (503) 725-3048; Email bergerc@cecs.pdx.edu

Columbia Slough Water Quality Model

The Columbia Slough is a tidally influenced freshwater system of wetlands, channels, and lakes located within the Portland, Oregon metropolitan area at the confluence of the Willamette and Columbia Rivers. Past structural changes to the Columbia Slough have included the filling in of wetlands and lakes and the construction of levees, dikes, culverts and irrigation channels. These changes have altered the natural flow dynamics creating an environment more conducive to eutrophication. The Columbia Slough has been designated as water quality limited for temperature, eutrophication (dissolved oxygen, pH, phosphorus, chlorophyl a), bacteria and toxics by the Oregon Department of Environmental Quality (DEQ). A hydrodynamic and water quality model, developed for the City of Portland by the Department of Civil and Environmental Engineering at Portland State University, was used to evaluate management alternatives to improve water quality in the system. The computer code applied was the Corps of Engineers model CE-QUAL-W2, which can simulate algae, macrophytes, dissolved oxygen, pH, nutrients, and organic matter. The model has also been applied to developing temperature total maximum daily loads (TMDL) for the Oregon DEQ. Currently the Columbia Slough model is being updated for the City of Portland to a newer version of CE-QUAL-W2, and will be used to investigate additional management scenarios.

Keywords: Hydrology, Water Quality
Time period: 1990 - 2000, 2002, 2005
Geographic Location: Columbia Slough; Portland, Oregon; Willamette River; Columbia River
Partners and Sponsors: City of Portland; Oregon Department of Environmental Quality

Bjorn, Andrew M.; Greve, Adrienne I.[1]; Oleyar, M. David[2]*; Withey, John C.

Urban Ecology Program, University of Washington
PO Box 352100, Seattle, WA 98195
[1] Phone: 206-579-2926, Email: aigreve@u.washington.edu
[2] Division of Ecosystem Sciences, College of Forest Resources
Phone: (206)543-2764 Email: doleyar@u.washington.edu

Evaluating Urban Forest Functionality: A Three Dimensional Approach

Management and protection of urban forests has focused on a limited number of the many benefits and functions of forests. These functions in an urban landscape are not constant, varying with forest size and location on the urban gradient. We measured economic, ecological, and social functions of forests across an urban gradient in residential areas of King County, Washington. We defined economic function as changes in housing prices correlated with forest cover variables in a hedonic price model for single-family home sales. We used a Correspondence Analysis of songbird communities from point count data to measure ecological function. We measured social function of forests by analyzing opinion surveys of residents' use of and satisfaction with neighborhood forests. These three measures of forest function were analyzed using a common independent variable: the urban gradient, as defined by forest patch size, distance to nearest forest patch, amount of forest cover, and human population density. Housing prices responded positively to increased forest cover and negatively to increased population density. Songbird communities in larger fragments and developments with high forest cover more closely resembled native forest communities than did smaller fragments and developments with little forest cover. Survey responses varied across the urban gradient, not always linearly: satisfaction with neighborhood attributes decreased with greater urbanization, while concern for negative attributes of forested areas was highest in suburban areas. There are tradeoffs involved in maximizing any single function of urban forests and our approach allows managers and planners to consider multiple functions at once.

Keywords: Economics, Environmental Social Sciences, Wildlife Biology
Time period: 1998 - 2004
Geographic Location: King County, WA
Partners and Sponsors: NSF Integrated Graduate Education and Research Traineeship

Boeder, Michael K.

Department of Geography, Portland State University
1721 SW Broadway, Cramer Hall 424, Portland, OR, 97207
Phone: (503) 544-0329, Email: mboeder@pdx.edu

Oxygen Dynamics, Land Cover Change, and Urban Runoff Management in the Rock Creek Basin, OR

This study investigates trends in dissolved oxygen (DO) parameters for the urbanizing Rock Creek watershed in northwest Oregon, U.S.A. The seasonal Kendall's test for trend on LOWESS residuals of the discharge-concentration relationship for DO (%sat), chemical oxygen demand, total Kjeldahl nitrogen, and ammonia-N, return multiple significant ($\alpha \leq 0.1$) trends from 1994 to 2003 for twelve sites in the Rock Creek watershed. In general, in-stream oxygen conditions improved (increasing DO sat, declining oxygen demand) in Rock Creek and its tributaries. Land cover change assessment through aerial photo interpretation reveals significant ($\alpha \leq 0.1$) change in agricultural, commercial, open water, and residential land cover for five sub-basins of the Rock Creek watershed from 1994 to 2000. Spearman's correlation analysis between multi-scale land cover assessment percentages and median seasonal constituent concentrations for the mid-1990s and 2000 reveal multiple significant ($\alpha \leq 0.1$) correlations suggesting the importance of scale in understanding oxygen demand in the Rock Creek basin. Finally, Spearman correlation analysis of 1000m local basin urban land cover variables and median seasonal constituent concentrations reveal significant ($\alpha \leq 0.1$) relationships between urban runoff management infrastructure, slope, and effective impervious area and oxygen demand. This local analysis suggests that, for nine sites in the Rock Creek basin, stormwater management may significantly influence oxygen demand.

Keywords: Hydrology, Land/Watershed Management, Water Quality
Time period: 1994 - 2003
Geographic Location: Rock Creek Watershed, Washington and Multnomah Counties, OR

Broshot, Nancy[1*]; Diedrich[2], Sandra; Dodds, Joshua[1]; Bogart, Rachel [1]; Philips, Cara[2]; Wells, Hannah[2]; McWhirter, Kevin[2]; Parker, Matthew[2]

[1]Department of Biology, Linfield College
2255 NW Northrup, Portland, OR 97210
*Phone: (503) 413-7034, Email: nbrosho@linfield.edu

[2]Portland Parks and Recreation, City of Portland
2960 NW Upshur, Portland, OR 97210

Mammalian Predation on Western Red Cedar (*Thuja plicata*) seedlings in an Urban Forest

Previous research in Portland, Oregon and elsewhere has shown low survival rates among tree seedling and sapling populations in urban forests. The research presented here was designed to ascertain whether mammalian predation on young conifers has a role in low seedling recruitment. Nine study sites were located in Forest Park in Portland Oregon, three in each section (urban, middle and rural). At each site, 27 young western red cedar (*Thuja plicata*) seedlings were planted. Each tree was randomly assigned to one of three groups: deer exclusion, rodent exclusion or control (no exclusion) and was measured prior to installation of exclusion devices (April 2005), as well as periodically throughout the summer. All tree heights, widths and basal diameters were measured, and the percentage of branches exhibiting grazing was calculated. Preliminary analysis of data collected through August 2005 indicates location of the trees in the park has a more significant effect on both the rate of predation and the increase in seedling height than does the treatment. We found the percentage of grazing over the four-month period was significantly greater at sites in the middle section of the park than in the more urban or rural sections, whereas increase in seedling height was significantly greater in the rural section. These data suggest populations of mammalian tree predators are more concentrated in the middle section of Forest Park, perhaps due to pressures from urbanization. Further results will be presented at the conference.

Keywords: Animal Ecology, Conservation Biology, Plant Ecology, Wildlife Biology
Time period: April 2005 to present (abstract goes through August 2005, but we are going to do another series of measurements in December 2005)
Geographic Location: Forest Park in Portland
Partners and Sponsors: Oregon Department of Forestry, Linfield College, Portland Parks and Recreation

Castro, Janine M.

U.S. Fish and Wildlife Service
2600 SE 98th Ave., Suite 100, Portland, OR 97266
Phone: (503) 231-6179, Fax: (503) 231-6195, Email: janine_m_castro@fws.gov

PSU Professional River Restoration Certificate Program Provides Team-Based Training to Watershed Professionals

Since 2002, researchers from eight universities have been developing the National River Restoration Science Synthesis Database to draw lessons from river restoration successes and failures. Additionally, the National Center for Earth Surface Dynamics, funded by NSF, selected "Stream Restoration" as one of their major knowledge transfer focus areas. And most recently, Wohl and others (WRR 2005) presented a collaborative assessment of the state of restoration science and practice. It has become increasingly clear that successful restoration projects are (1) based on watershed-scale analysis and planning, and (2) incorporate techniques based on the developing theoretical framework for restoration science. What does this mean to the practicing river restoration professional? It means that it is not enough to be an expert in a particular scientific or engineering discipline. Professionals must possess a functional knowledge of the collaborative process, and understand how their practice fits into the overall project structure. This "big picture" knowledge enhances the effectiveness of the individual's professional contribution, and guides research and continuing education in their field of expertise. With this goal in mind, Portland State University's Environmental Professional Program has developed the first River Restoration Professional Certificate program in the country. Designed to extend the skills and effectiveness of qualified professionals, the RRPC delivers core and elective courses covering river science and management; stream ecology; reconnaissance and monitoring; restoration design approaches; and team building and communication. Delivered by regional experts and practitioners, the curriculum provides training with a focus on collaborative planning, restoration theory, and field expertise under actual project conditions.

Keywords: Environmental Education, Land/Watershed Planning, Habitat Restoration
Partners and Sponsors: Portland State University Environmental Professional Program, River Restoration Northwest, US Fish and Wildlife Service, NOAA Fisheries/National Marine Fisheries Service, American Fisheries Society, North Coast Land Conservancy, Henderson Land Services, Interfluve, Jones and Stokes, Inc., Parametrix

Curry, Tierra[1] and Murphy, Michael T.

Biology Department, Portland State University
PO Box 751 Portland, OR 97207
[1]Phone: (503) 274-8262 E-mail: tierra@pdx.edu

Impacts of Water-control Structures on Native Amphibians and Invasive Bullfrogs

The objective of this research is to evaluate the impacts of using water-control structures to seasonally drain wetlands on native pond-breeding amphibians and invasive bullfrogs. Methods include tracking egg-masses and larvae to assess survival and reproductive success. Work in 2005 revealed that red-legged frogs may not be able to complete metamorphosis by mid-June when draining traditionally occurs. Initial results indicate that timing of structure opening should be reconsidered on a yearly basis and coupled with monitoring to prevent the unintentional flushing and desiccation of red-legged frogs. Draining washes bullfrog larvae out of the wetlands, but a small percentage of remaining bullfrog tadpoles can successfully metamorphose by burrowing in the mud. To control bullfrogs, draining would have to be coupled with ongoing larval and adult removal. Research is being conducted in 2005 and 2006 in the Lower Willamette watershed at Metro Multnomah Channel Floodplain, Oaks Bottom, Burlington Bottoms, and Bybee Lake.

Keywords: Land/Watershed Management, Hydrology, Animal Ecology
Time period: 2005 - 2006
Geographic Location: Lower Willamette Watershed: Oaks Bottom, Burlington Bottoms, Bybee Lake, Metro Multnomah Channel Floodplain, Stormwater Ponds, OR
Partners and Sponsors: Oregon Watershed Enhancement Board, Metro, Portland Parks, ODFW, BES, Portland Audubon

Durocher, Ryan[1*]; Deitemeyer, Matt; Kaler, Daniel; Ray, Charles[1]

[1]City of Vancouver, Urban Forestry
PO Box 1995, Vancouver, WA 98668-1995
*Phone: (360) 619-1108, Email: ryan.durocher@ci.vancouver.wa.us

Utilizing LiDAR Data to Assess and Analyze the Urban Forest Canopy in Vancouver, Washington

The Canopy Study for the City of Vancouver was performed to quantify the amount of canopy cover within the city limits. There were several goals for this study: (a) evaluate current canopy characteristics, (b) establish benchmark conditions for future studies, (c) establish target canopy density, and (d) propose strategies for reaching the target density. The City of Vancouver study utilized digital data acquired in April 2002. This data involved two types of remotely sensed techniques: (a) Light Detection and Ranging (LiDAR) and (b) infra-red photography. The LiDAR data was analyzed to identify above surface features and the infra-red data was analyzed to identify vegetation areas. Upon performing an overlay of these data, one could classify the landcover type and canopy height (for this study, tree canopy areas were defined as vegetation exceeding a 7 foot height). By evaluating 300 random sample points, the canopy location was determined to have an accuracy of 92.7 percent. Using the GIS output for the Canopy Study, there was approximately 5,425 acres of canopy cover within the City of Vancouver in June 2002. Thus, the net canopy density within city limits was determined to be 19.7 percent. Canopy cover was quantified for park and school properties and according to neighborhood association boundaries. The City of Vancouver has established a tree canopy goal of 28 percent; the data from this study is currently being used to prioritize the tree planting efforts of Vancouver's Canopy Restoration Program.

Keywords: Land Use Planning, Land/Watershed Management, Plant Ecology
Time period: 2003 - 2004
Geographic Location: Vancouver, Washington
Partners and Sponsors: Clark County GIS

Emmerson, Kendel

Mason, Bruce, & Girard, Inc.
707 S.W. Washington Street Suite 1300 Portland, OR 97205
Phone: (503) 224-3445, Fax: (503) 224-6524, Email: kemmerson@masonbruce.com

Peregrine Falcon Nest Monitoring and Management during the St. John's Bridge Rehabilitation Project

Mason, Bruce, & Girard (MB&G) has been contracted by the Oregon Department of Transportation (ODOT) to monitor the nesting peregrine falcons at St. Johns Bridge since 2002. Peregrine falcons, a state endangered species in Oregon, have occupied the St. John's Bridge since 1996 and have nested successfully on the bridge every year since 2000. ODOT initiated the St. John's Bridge Rehabilitation Project in 2003. This significant, multi-year project included replacing the bridge deck and painting the entire bridge, as well as performing many electrical upgrades. ODOT made numerous changes to the project staging and the construction schedule to minimize impacts to nesting peregrines, however due to the immensity of the project it was infeasible to assume that the nesting peregrine falcons would not be impacted. ODOT received an Incidental Take Permit (ITP) from the Oregon Department of Fish and Wildlife (ODFW) requiring several conservation measures, terms, and conditions. One such measure was to provide monitoring to determine nesting chronology and to document peregrine falcon behavior in response to construction activities. MB&G's Peregrine falcon monitoring efforts at the St. John's Bridge demonstrate the unpredictability of peregrine falcon nesting behavior and their tolerance to disturbance.

Keywords: Wildlife Biology, Transportation, Animal Ecology
Time period: 2003 - 2005
Geographic Location: City of Portland, OR
Partners and Sponsors: ODOT, Audubon Society of Portland, Oregon Department of Fish and Wildlife
Publications:

Oregon Department of Transportation's Peregrine Falcon Management Plan 2001-2007. 2001. Prepared by Mason, Bruce, & Girard in 2000 and revised by the Oregon Department of Transportation. Salem, Oregon. Available at: http://www.oregon.gov/ODOT/HWY/GEOENVIRONMENTAL/docs/research-peregrine_falcon_plan.pdf

ODOT Peregrine Falcon Monitoring 2002 Annual Report. Mason, Bruce, & Girard. Portland, OR

ODOT Peregrine Falcon Monitoring 2003 Annual Report. Mason, Bruce, & Girard. Portland, OR

ODOT Peregrine Falcon Monitoring 2004 Annual Report. Mason, Bruce, & Girard. Portland, OR

ODOT Peregrine Falcon Monitoring 2005 Annual Report. Mason, Bruce, & Girard. Portland, OR

Geddes, Janelle

Metro, Nature in Neighborhoods
600 NE Grand Avenue, Portland, Oregon 97232
Phone: (503) 797-1550; Email: geddesj@metro.dst.or.us

Nature in Neighborhoods – Metro's Grant Program and Local Capacity

Metro has committed funding to a two-year grant program of $1 million dollars for a region-wide program to protect nature in neighborhoods. Requests for pre-applications were released in November 2005 and were due mid-January 2006. There were three distinct categories of grants targeting differing aspects of restoration and capacity throughout the region. Since this is a new program, ascertaining capacity at the regional level was a focus of the pre-application request. The grants are tied to Regionally Significant Habitat and ask applicants to identify if their project is within one of these areas as well as asks applicants to identify and link their project to their local watershed. Through doing this, participants will be learning how their activities are tied to water quality, fish and wildlife habitat and the livability of the region. Mapping and categorizing pre-applications will illustrate regional restoration needs. In time, other jurisdiction and local efforts in restoration combined with Metro's restoration work and this grant program will be utilized in a regional mapping system. This information will paint a picture of restoration activities and successes and provide a framework for future projects and partnerships.

Keywords: Habitat Restoration
Time Period: 2006 - 2008
Geographic Location: Within the Metro jurisdictional boundary; Multnomah, Clackamas and Washington counties, OR

Geiser, L. H.[1*]; Fenn, M.E.[2]; Bachman, R.[3]; Blubaugh, T.J.[2]; Bytnerowic, A. Z.[2]

[1]USDA Forest Service
Siuslaw National Forest
PO Box 1148, Corvallis, OR 97339
*Phone: (541)-750-7058
Email: lgeiser@fs.fed.us

[2]USDA Forest Service
Pacific Southwest Research Station
4955 Canyon Crest Drive
Riverside, CA 92507

[3]USDA Forest Service
Pacific Northwest Regional Office
PO Box 3623
Portland, OR 97208

Atmospheric Deposition Inputs and Effects on Lichen Chemistry and Communities in the Columbia River Gorge

Topographic and meteorological conditions make the Columbia River Gorge an 'exhaust pipe' for air pollutants generated by the Portland-Vancouver metropolitan area and the Columbia Basin. To assess the severity of atmospheric deposition in the Gorge, we analyzed nitrogen (N) and sulfur (S)concentrations and pH of fog and bulk precipitation; N and S deposition in throughfall; ambient NO_2, NO, NH_3 and SO_2; NH_4NO_3 and $(NH_4)_2SO_4$ concentrations in airborne particulates; concentrations of N and S in lichen tissue; and nitrophytic lichen distribution. Throughfall N and S deposition were high, 11.5 - 25.4 and 4-8 kg ha^{-1} over 4.5 months at all 9 and 4/ 9 sites respectively. Throughfall and lichen tissue N were highest at eastern- and western-most sites, implicating both agricultural and urban sources. Acidity of fog and precipitation was high: pH 4.0-4.5 with some instances < 4.0. Ambient NO_x, NH_3 and SO_2 concentrations peaked in winter at only 15.3 and 3.7 ppb, implicating long distance transport of ammonium sulfates and nitrates rather than gaseous pollutants as the primary source of N & S inputs. Nitrophytic lichens, indicators of nitrogen-enriched environments, were common in the Gorge but sparse in bordering national forests; tissue N and S concentrations were 3x higher in the Gorge than surrounding national forests and comparable to urban levels, supporting other evidence of enhanced N and S deposition there. Atmospheric N deposition inputs were at levels shown to impact western ecosystems and threaten cultural resources.

Keywords: Air Quality, Plant Ecology, Environmental Policy
Time period: 1996 - 2004
Geographic Location: Oregon and Washington, focus on Portland-Vancouver metro area, the Columbia River Gorge National Scenic Area, and the Columbia Basin

Gersib, Richard A.

Washington State Department of Transportation, Watershed Program
PO Box 47331, Olympia, WA 98504
Phone: (360) 705-7477, Fax: (360) 705.6833, Email: gersibd@wsdot.wa.gov

Identification of Mitigation Sites Through Watershed Characterization

The Washington State Department of Transportation (WSDOT) is implementing a scientific approach to watershed assessment, based in WSDOT's desire to provide more environmentally responsible mitigation that is at the same time more cost-effective. The watershed characterization methodology establishes a more complete understanding of project effects, the condition of surrounding natural resources, and potential mitigation options. A set of guiding principles directs methodology development. To maximize environmental benefit, the efforts focus on the recovery of ecosystem processes. In Western Washington, key ecological processes include the delivery and routing of water, sediment, pollutants, large wood, heat, and habitat integrity/connectivity. Understanding the effects of transportation and surrounding land use impacts on ecological processes requires the formation of an interdisciplinary technical team with access to Geographical Information Systems tools and spatial data. A series of watershed characterization projects have allowed refinement of the methodology. The most recent project addressed impacts of and mitigation for future highway projects in parts of the rapidly urbanizing Green / Duwamish and Puyallup watersheds. These projects include a proposal to widen State Route 167, a freeway which lies almost entirely on floodplains and historic wetlands. In the 350 square mile study area, nearly 4,800 riparian, wetland, and floodplain areas were evaluated. Of these, 1,026 potential restoration sites met minimum criteria for natural resource mitigation, while 569 sites met minimum criteria for stormwater flow control mitigation.

Keywords: Environmental Policy, Land/Watershed Management, Transportation
Time period: Methodology developed 2002 – 2005, four studies completed 2002 – 2005
Geographic Location: The four completed watershed characterization studies have been located in the Snohomish River, Sammamish River / Lake Washington, Green River, and Puyallup River drainages, in parts of Snohomish, King and Pierce Counties, Washington
Publications:

Gersib, R. *et al.* 2004. Enhancing Transportation Project Delivery Through Watershed Characterization: Methods Document (Operational Draft). WSDOT. http://www.wsdot.wa.gov/environment/watershed/docs/methods.pdf

Gersib, R. *et al.* 2005. Enhancing Transportation Project Delivery Through Watershed Characterization, SR-167 Study. Washington State Department of Transportation. www.wsdot.wa.gov/environment/watershed/watershed_sr167.htm

Guillozet, Peter

Clean Water Services
2550 SW Hillsboro Hwy, Hillsboro, OR 97123
Phone: (503) 681-4470, Fax: (503) 681-3603, Email: guillozetp@cleanwaterservices.org

Landscape Scale Knotweed Control in the Tualatin River Basin

Japanese (*Polygonum cuspidatum)*, giant (*P. sachalinense*) and Himalayan (*P. polystachyum*) knotweeds are highly invasive species on the increase throughout the Portland metropolitan area. Recognizing this mounting threat, Clean Water Services (District), a public utility serving nearly 500,000 residents in urban and suburban portions of the Tualatin River watershed, began a control project in 2005. Herbicide treatment methods included stem injection and foliar application. By September 2005 the District's contractor had treated all of the nearly 200 known patches within the District's service area. However, outside of this area in largely agricultural and forest lands the largest known patches remained untreated. To build momentum for knotweed control in those areas the District conducted a pilot project with the Tualatin River Watershed Council, treating several large patches along upper Gales Creek. To ensure adequate control throughout the watershed, the District is currently developing knotweed partnerships with the West Multnomah County and Tualatin River Soil and Water Conservation Districts. Treatment during the second year will consist of injection at previously untreated patches between June and September and foliar application to previously treated patches in September. Following completion of the second season of treatment, the District will replant treated riparian sites on public lands with fast growing native trees and shrubs. During the third year the contractor will return to treated sites and, where necessary, repeat the foliar application. The District will monitor and treat knotweed on an ongoing basis with the goal of eradicating these species from the basin.

Keywords: Water Quality, Habitat Restoration, Land/Watershed Management
Time period: 2005 - 2007
Geographic Location: Tualatin River watershed, Washington County, OR

Hennings, Lori

Metro Regional Government
600 NE Grand Avenue, Portland, OR 97232
Phone: (503) 797-1940, Email: hennings@metro.dst.or.us

Metro's New Ecosystem Monitoring Program

Metro is initiating a new Ecosystem Monitoring Program associated with the new Nature in Neighborhoods initiative. Nature in Neighborhoods is a region-wide conservation initiative that brings people and governments together to ensure a healthy urban ecosystem. It will add more hands-on capacity for conservation education and habitat restoration. Metro has made a concerted effort to evaluate ecological conditions throughout the tri-county region, and has used such ecological evaluations to help direct policy decisions. Metro has adopted a formal set of GIS-associated ecological indicators. These indicators include baseline conditions and targets for forest canopy and vegetation, stream health, large habitat patches and connectivity, and tracking declining Habitats of Concern such as native oak and riparian bottomland forest. The monitoring program will also entail gathering regional scientific data to gauge watershed health and ecology-oriented efforts over time (see Hennings' abstract on Metro's interactive web mapping tool). Metro is planning for a new funding measure to acquire open spaces and high-value habitat from willing sellers. Metro will also offer assistance and incentives to conservation groups, developers, businesses and homeowners to protect watersheds and wildlife habitat through voluntary efforts. Metro Council also supports the region's environmental health through restoration grants (see Geddes abstract), promoting habitat-friendly development practices, illegal dumpsite cleanup, community enhancement grants, neighborhood cleanup program, hazardous waste disposal, and natural gardening. For more information, see Metro's web site at www.metro-region.org or contact the author of this abstract.

Key words: Environmental Policy, Land Use Planning, Sustainable Development
Time period: 2005 - ongoing
Geographic Location: Tri-county Portland metropolitan region, OR

Hennings, Lori

Metro Regional Government
600 NE Grand Avenue, Portland, OR 97232
Phone: (503) 797-1940, Email: hennings@metro.dst.or.us

Need Data? Want to Know about Restoration Sites? Join Metro's Interactive Mapping Web Tool!

Metro is initiating a new interactive mapping web tool and we'd like to invite you to join. The web tool will include at a minimum, information on and location of restoration sites and ecological study sites in the greater Portland metropolitan region. On Metro's web tool you will be able to sign on as a user for free and enter your restoration or ecological study information. You will also be able to zoom in on your watershed of interest, point at a symbol on the map, and pop up a data file. The data file will contain information such as: who conducted the project and associated contact information, partners, key project aspects, location(s), funding source, and if offered, a hot link to a web site with more information about the project. The project will help Metro gather data to act as a data repository for the region and keep track of watershed health and citizen efforts over time. It will also help citizens and organizations to identify what's already been accomplished, what is still needed, and potential partners and funding resources within their watershed of interest. We anticipate launching the web tool in 2006, and with your support it will become more powerful over time. To participate in forming or contributing to the web tool, join the Urban Ecosystem Research Consortium's list serve (instructions at http://www.esr.pdx.edu/uerc/); the author will notify the list serve when the web tool is activated. Alternatively, contact the author of this abstract.

Key words: Animal Ecology, Habitat Restoration, Water Quality
Time period: 2003 - 2005
Geographic Location: Clackamas County, OR

Hennings, Lori

Metro Regional Government
600 NE Grand Avenue, Portland, OR 97232-2736
Phone: (503) 797-1940, Email: hennings@metro.dst.or.us

Oregon's Newest City: Rolling Out the Damascus Concept Plan

In 2003, the greater Portland area's Urban Growth Boundary (UGB) expanded by more than 12,000 acres in the Damascus-Boring area, the single largest expansion of the UGB since its establishment. This area is expected to develop over the next 20 years with approximately 25,000 additional residences, a town center, and 1,657 acres of employment land. In 2003, Metro collected baseline water quality data to support the concept planning process and enable documenting changes over time. In 2004, Clackamas County and Metro, in partnership with local cities and citizen groups, began the concept planning process required before urban development can occur. After two years of study, analysis, meetings and public input, the draft concept plan for the Damascus/Boring/east Happy Valley area was presented to the public during a community forum on October 8, 2005. The plan is founded on the region's extensive natural resources and includes a variety of ways to protect and address streams, wetlands, wildlife habitat, connectivity, and the area's ecologically sensitive volcanic lava domes, which are largely forested and contain numerous headwaters. Hundreds of citizens learned about and commented on the different components of the plan. A report and extensive appendices to document public comments on the draft concept plan have been prepared. The Cities of Damascus and Happy Valley will use the final concept plan - to be completed later this year - to help guide development of comprehensive plans and zoning development ordinances. More information is available at www.co.clackamas.or.us/dtd/lngplan/damascus/index.html.

Key words: Land Use Planning, Land/Watershed Management, Sustainable Development
Time period: 2003 - 2005
Geographic Location: Clackamas County, OR

Hope, Bruce

Oregon Department of Environmental Quality, Air Quality Division
811 SW Sixth Ave., Portland, OR 97204
Phone: (503) 229-6251, (503) 229-5675, Email: hope.bruce@deq.state.or.us

A Model for Mercury in the Willamette River Basin

Methylmercury levels in fish have triggered health advisories in Oregon's Willamette River Basin (Basin). Subsistence fishing populations in urban areas are potentially at greater risk due to their higher consumption rates of residential fish. As part of the Willamette Total Maximum Daily Load process, a seasonally-responsive, time-dependent mass balance model was developed to estimate: (a) loads from identified natural and anthropogenic mercury sources, (b) relative contributions of these sources to the river, (c) mercury levels in surface water, sediment, and fish tissue, and (d) how changes in loadings may affect these levels. Global air sources are estimated to be the largest single input (≈780 kg yr^{-1}) to the Basin, greatly overshadowing contributions from local anthropogenic air sources (≈160 kg yr^{-1}). Within the Basin, approximately 1000 kg of Hg is deposited annually to land from the atmosphere, but much (≈85%) of this deposition is returned via volatilization. Fluvial load (≈100 kg yr^{-1}) and advection (≈800 kg yr^{-1}, ≈45% of atmospheric inputs) are the principal outputs from the Basin. Particulate and dissolved phase runoff of mercury in native soils are the largest (≈40%) sources of mercury to surface water; while runoff of anthropogenic air emissions comprises ≈20%. All other currently known non-atmospheric sources make only minor (≈3%) mercury contributions to the river. Because local sources make smaller contributions relative to persistent global sources (over which there is little, if any, possibility of local control), local or regional environmental management actions alone may not be adequate to address mercury issues within the Basin.

Keywords: Air Quality, Water Quality, Land/Watershed Management
Time period: 2002 - 2005
Geographic Location: Willamette River Basin, Oregon
Partners and Sponsors: U.S. EPA (sample collection & analysis)
Publications:

Hope BK. An assessment of anthropogenic source impacts on mercury cycling in the Willamette Basin, Oregon, USA. *Science of the Total Environment* (*corrected proof online 17 May 2005*).

Hope BK. A mass budget for mercury in the Willamette River Basin, Oregon, USA. *Water, Air, and Soil Pollution* 161 (1-4): 365-382, 2005.

Hosty, Maureen

Oregon State University Extension 4-H
c/o Sunnyside Environmental School
3421 SE Salmon, Portland, OR 97213
Phone: (503) 916-6075, Email: Maureen.hosty@oregonstate.edu

Advancing the Science of Urban Ecosystems along the Urban-Rural Interface

Environmentally, economically, and socially, Oregon is dynamic and complex. Forty-one percent of the total state population lives in the Portland metropolitan area, the state's largest city. The Portland metropolitan area drives the state's economy. Its size and wealth make it the most influential city in the region. By contrast rural Oregon is still relatively wild and varied, and its political power is drastically dwindling. Eastern Oregon comprises over half the total land in Oregon but only 4.3% of the population, which makes it one of the remaining frontiers of the country. Its business leaders and politicians are struggling against the loss of political power. As the region's economic underpinning erodes, the fissure between the state's most- and least-populated areas continues to widen. This urban-rural divide is especially pronounced in regards to how youth and adults feel their natural resources should be managed. In order to effectively understand urban ecosystems and how decisions we make impact this urban-rural divide, youth and adults must first gain a platform of knowledge on which to base their decisions. The OSU Extension 4-H Wildlife Stewards Program is made up of volunteers who live in urban, suburban and rural areas of the state. Their views on the environment and natural resource management are as varied as the broader political landscape of Oregon. The OSU Extension 4-H Wildlife Stewards provides pieces of that platform and bridges the divide between urban and rural Oregonians by bringing Oregon youth and adults together one school at a time.

Keywords: Habitat Restoration, Environmental Education, Environmental Social Sciences
Time period: 1997 - 2005
Geographic Location: Oregon statewide
Partners and Sponsors: National Science Foundation, Society for Range Management, Grant County 4-H

Klock, Clair[1]; Swan, Kim[2]; Phipps, Dave[3]

[1]Conservation Specialist
Clackamas Soil & Water Conservation District
256 Warner-Milne Rd. Rm 2
Oregon City, OR 97045
Email: Clair.Klock@or.nacdnet.net

[2]Education Coordinator
South Fork Water Board
15962 S. Hunter Ave.
Oregon City, OR 97045

[3]Stone Creek Golf Course
Clackamas County
14603 South Stoneridge Drive
Oregon City, OR 97045

Golf Course Quality Lawns - "Microwatersheds": Reducing Fertilizer and Pesticides in Urban Surface and Groundwater

Clackamas Soil and Water Conservation District (CCSWCD), Stone Creek Golf Course, Oregon Golf Course Superintendent Association and South Fork Water Board have developed a four hour lawn care course for urban homeowners. The conservation district enlisted the golf course and water conservation professionals to assist in teaching these classes. The course is designed to reduce the amount of fertilizers and pesticides applied to home lawns and landscapes, while reaching the homeowners goal of making the lawn look better. The class consists of a Turf Management section that emphasizes Best Managment Practices (BMP's) of the Audubon Golf Course Certification program. These practices employ precise fertilizer and pesticide application in conjunction with soil sampling and water monitoring, habitat buffer and planting, and irrigation efficiency, The Irrigation Management (IM) section seeks to reduce water consumption by introducing homeowners to efficient and well maintained irrigation systems. Proper IM reduces fertilizer and pesticide needs and increase turf health. Recently the Oregon Department of Environmental Quality (DEQ), United States Geological Survey (USGS) and Clackamas SWCD has cooperated in identifying locations in the new Damascus urban growth boundary for monitoring of fertilizers and pesticides in streams. The Clackamas Conservation District, DEQ, is now embarking on a plan to target specific *"Microwatersheds"* (neighborhoods). The goal is the long-term is to reduce the stream pesticides and nutrient levels in those "*Microwatersheds*". The district is seeking to develop a partnership of agencies, watershed councils, and SWCD's to reduce fertilizers and pesticides in surface and groundwater in the Portland Metro area.

Keywords: Environmental Education, Land/Watershed Management, Water Quality

Labbe, Jim[1] and Radin, Kenneth[2]

[1]Audubon Society of Portland
5151 NW Cornell Rd, Portland, OR 97210
Phone: (503) 292-6855 x112, Email: jlabbe@urbanfauna.org

[2]Population Research Center
Portland State University
PO Box 751, Portland, OR 97207

Nature in your Neighborhood?: Access to Public Parks and Nature in the Portland Metro-region

A growing body of research from a variety of disciplines documents the positive health effects, both physical and psychological, of human access to nature. Many studies have related indicators of individual and community health to access to urban greenspaces. Our study evaluated access to public parks and natural areas in the Portland-Metro Region as part of Coalition for a Livable Future's "Regional Equity Atlas" project. We asked: *How can we measure and evaluate access to parks in the region? What disparities exist within and between the region's cities and neighborhoods? Are we adequately and equitably keeping nature nearby?* Our primarily GIS analysis combined census data, park-acres, and street walking distances to public parks (Metro 2003 greenspace inventory), into one integrated parks-access measure. We summarized these and other demographic variables by the region's neighborhoods. Just over half (51.8%) of Portland-Metro region population (inside UGB) lives within 1/4 mile walking distance from a public park. Using the combined measure suggests that high child poverty neighborhoods tend to have less access than low child poverty neighborhoods. 45% of below average parks access neighborhoods have above average child poverty rates, while only 35% of above average parks access neighborhoods have above average child poverty rates. Disparities increase between top and bottom tier parks access. A different analysis using Metro's inventory of regionally significant habitat found that 64% of the region's population (inside UGB) lives within a 1/4 mile of a natural area. Again, poorer neighborhoods are consistently more nature poor than more affluent neighborhoods.

Keywords: Environmental Social Sciences, Land Use Planning
Time period: Study 2002 to present. Data/analysis period: 2000 to present.
Geographic Location: Portland-Metro region, OR
Partners and Sponsors: Coalition for a Livable Future, Institute for Metropolitan Studies, Portland State University

Larson, Kelli L.

International Institute for Sustainability, Department of Geography, Arizona State University
Tempe, AZ 85287
Phone: (480) 727-3603, Email: kelli.larson@asu.edu

Attitudes toward Water Resource Protection: Differences between Participants and Non-Participants of Place-based Groups

Public participation analysts and practitioners face the critical question of who should be involved in environmental decision-making. Participants are often representatives of organized groups who share similar demographic characteristics and are not representative of the general public. This raises concerns about differences in the interests and views of people who do and do not participate in these groups. This research addressed the degree to which multidimensional attitudes toward water resource protection vary between participants and non-participants of place-based groups, specifically neighborhood associations and watershed councils, in the Johnson Creek Watershed of metropolitan Portland, Oregon. Analyses were conducted on thirty-four individual aspects of resource protection, with focus on five attitudinal dimensions: general importance of values, support/opposition toward government, regulations, and economic measures, and overall attitudes (combination of previous four). Data were collected via a mail questionnaire and semi-structured interviews, and both quantitative and qualitative analyses were conducted. Overall, watershed council participants were supportive of all aspects of resource protection except human-centered (relative to biocentric) values and the efforts of businesses and the federal government. By contrast, participants of neighborhood groups were relatively representative of non-participants with the exception of economic support for resource protection. Participants of both groups differed significantly from non-participants in terms of sociodemographics including education and income. In this presentation, research findings will be presented along with implications for engaging individuals in place-based groups and involving these groups in participatory planning.

Keywords: Environmental Social Sciences, Land Use Planning, Land/Watershed Management
Time period: Research conducted 2002 - 2004
Geographic Location: Johnson Creek Watershed, OR
Partners and Sponsors: Funding provided by National Science Foundation, with additional printing support from Metro.
Publications: See http://geography.asu.edu/klarson/ for more information.

Larson, Kelli L. 2004. *Residents' Attitudes toward Water Resource Protection in Metropolitan Portland, Oregon.* Ph.D. Dissertation, Oregon State University, Department of Geosciences, Geography Program. Defended in December 2004.

Lawhead, Matthew

Oregon Department of Fish and Wildlife
3406 Cherry Ave. NE, Salem, OR 97303
Phone: (503) 947-6098, Email: matthew.a.lawhead@state.or.us

Conservation Strategy for Oregon: Focusing Conservation Efforts

The Conservation Strategy for Oregon, completed in October 2005, provided Oregon Department of Fish and Wildlife an opportunity to realign our conservation priorities, strengthen our partnerships within the conservation community, and create tools to help protect and enhance our natural resources. An important component of the Strategy was the development of Conservation Opportunity Areas (COAs), places Oregonians can focus conservation efforts to meet broad fish and wildlife goals. GIS tools were used to analyze information on species and habitats, landscape condition, and existing planning efforts to define areas with the best suitability for conservation actions. Although these are not the only places we encourage conservation, focusing our efforts on priority landscapes will help us promote cooperation across land ownership boundaries, improve funding efficiency, and increase the likelihood of long-term success over larger areas. Along with the rest of the Strategy, Conservation Opportunity Areas will continue to be developed and refined to reflect a changing landscape and updated information.

Keywords: Conservation Biology, Land Use Planning, Wildlife Biology

Lindbo, D. Torrey

Student Watershed Research Project
Environmental Sciences & Resources, Portland State University
PO Box 751, Portland, OR 97207
Phone: (503) 725-2343, Email: lindbo@pdx.edu

Snapshot Water Quality Monitoring Events as a Means of Landowner Education/Outreach in Targeted Watersheds

The Student Watershed Research Project (SWRP) has worked with the Clackamas River Basin Council over the past three summers to offer community watershed labs, where streamside landowners in targeted areas are invited to collect and deliver surface water samples from their property for analysis of E. coli, nutrient, and other water quality parameters. Through Portland State University's senior capstone program, SWRP staff involve high school and college students in these watershed monitoring/community outreach events in the Clackamas Basin. Results from each snapshot event, as well as BMPs for prevention of nonpoint source pollution evident from data collected, are mailed to landowners in each area.

Keywords: Environmental Education, Water Quality
Time period: July 2003, 2004, 2005
Geographic Location: Clear, Foster, Richardson, Rock, and Sieben Creeks, Clackamas River Basin, Clackamas County, OR
Partners and Sponsors: Clackamas River Basin Council, Clackamas High School, PSU Environmental Sciences & Resources and University Studies

Lloyd, John[1]; Trask, Melinda[2]; Casey, Alexis[1*]

[1]Mason, Bruce & Girard, Inc.
707 SW Washington St, Suite 1300, Portland, OR 97205
Phone: (503) 224-3445, Email: jlloyd@masonbruce.com
[*]Phone: (503) 224-3445, Email: acasey@masonbruce.com

[2]Oregon Department of Transportation
123 NW Flanders, Portland, OR 97209
Phone: (503) 731-4804, Email: melinda.trask@odot.state.or.us

Wildlife Hot Spots along Highways in Northwestern Oregon

Determining locations where wildlife movement and highway operation conflict is an essential first step in making highways safer for motorists and animals. Using an expert-opinion approach, we identified 86 conflict areas (hot spots) for wildlife along state-maintained roads in the Oregon Department of Transportation's Region 1. Of the 757 miles of highway analyzed, 22% were identified as wildlife hot spots by expert teams, suggesting that the scope of this problem is substantial. Most of these hot spots were locations with frequent deer-vehicle collisions, although some were crossing locations for deer and elk that did not have frequent animal-vehicle collisions. Some hot spots were identified for non-focal species, including northwestern pond turtle, western painted turtle, coyote, bobcat, black bear, and beaver. Hot spots generally were associated with topographic features that directed animals towards highways, the presence of habitat adjacent to highways, or food resources that attracted animals. Six hot spots were considered high priority. The expert-opinion approach employed for this analysis was effective in rapidly assessing many miles of state-maintained highway for the presence of wildlife hot spots, and may prove useful in addressing conflicts between wildlife and highways in other locales, or on a statewide basis. Not all of the hot spots warrant mitigation, although we suggest that the areas identified in this analysis be examined more carefully during development of projects that may affect wildlife passage.

Keywords: Transportation, Land Use Planning, Wildlife Biology
Time period: 2005
Geographic Location: Oregon Department of Transportation Region 1; Washington, Columbia, Clackamas, Multnomah County, OR
Partners and Sponsors: Oregon Department of Transportation, Natural Resources Unit, Geo-Environmental Section

Mavko, Matthew[1] and George, Linda[2]

Environmental Sciences & Resources/Center for Science Education
Portland State University
PO Box 751, Portland, OR 97211
[1]Phone: (503) 725-3861, Email: mavko@pdx.edu
[2]Phone: (503) 725-3861, Email: georgel@pdx.edu

Assessing Air Quality Impacts of an Urban Freeway in Portland, OR with Spatially Intensive Monitoring and Dispersion Modeling

Highway and arterial traffic congestion is an increasing problem in Portland, OR. While the Portland-Vancouver airshed is generally cleaner than many urbanized areas, traffic-induced air pollutants are a cause for concern in many neighborhoods adjacent to freeways. The air quality impact of urban freeways has been difficult to evaluate at the neighborhood scale because of the cost of making measurements at the necessary spatial intensity. In this study we have made spatially intensive measurements of nitrogen dioxide near I-5 North. Nitrogen dioxide is emitted in combustion exhaust and can be considered an indicator species for combustion related pollution. Based on the methods of Palmes, et al. (1976) and several more recent studies, we describe a method of constructing and deploying low-cost NO_2 passive diffusion sensors and calibrating them in a controlled environment. Laboratory calibration of our diffusion tubes shows excellent agreement (+/- 5%) with a continuous chemiluminescence monitor. Several field studies were conducted with these tubes. Our I-5 studies indicate that there are above-background levels of NO_2 to the west and even higher levels to the east of I-5 in North Portland near Peninsula Park. The results were compared to CALINE4, a line dispersion model often used for urban pollution assessment. Detailed fleet, emission factor, and meteorological data were available as inputs to the model, which was adapted to run for the length of the field study. There are interesting discrepancies between the two methods, with implications as to the efficacy and practicality of CALINE4 over measurement-based methods of assessment.

Keywords: Air Quality, Transportation
Time period: 2004 - 2005
Geographic location: North Portland, Portland, OR
Partners and Sponsors: Environmental Protection Agency

McKay, Jenny E.[1]; Smith, Sarah B.; Murphy, Michael T.

Biology Department, Portland State University
PO Box 751, Portland, OR 97207
[1]Phone: (971) 275-3016, Email: jemckay@pdx.edu

A Video Survey of Parental Feeding Behavior in the Spotted Towhee (*Pipilo maculatus*)

Increased urbanization has led to habitat fragmentation and may influence food availability for wildlife in urban environments. Food availability plays a major role in avian reproduction, and research suggests a positive relationship between it and clutch size, nestling growth, and ultimately, offspring survival. I examined variation in nestling provisioning of Spotted Towhees (*Pipilo maculatus*) nesting within six parks in Portland, Oregon. In 2005, I used camouflaged video recorders to film parental feeding behavior at 75 nests in parks of varying size, usage, topology, and vegetation type. Preliminary results suggest a difference in feeding rate between parks as well as a seasonal decline in food availability. In addition, females fed nestlings at higher rates than males. In the future, I will compare these differences to the spatial distribution of nests and their proximity to park edges and trails. I will also investigate how food availability affects patterns of predation and parental provisioning strategies. Finally, I will evaluate the relationship between indicators of nestling condition (nestling weight and hematocrit value) and nest proximity to park boundaries. This study will provide valuable information about the relationship between food limitation and reproductive strategies in an urban environment.

Keywords: Animal Ecology, Conservation Biology, Wildlife Biology
Time period: March 2005-August 2005, March 2006-August 2006
Geographic Location: SW Portland Oregon Parks (Maricara, Lesser, West Portland, Springbrook, PCC Woodlot, and a 1 hectare neighborhood lot), OR

Mullinax, Steve[1] and von Salza, Victor

Bridlemile Creek Stewards
4648 SW 39th Dr. Portland, OR 97221
[1] Phone: 503.768.9065, Email: steve.mullinax@alum.mit.edu

***Your Watershed Habitat* Display and Web Site**

Your Watershed Habitat is a table-top display which introduces lot-scale restoration and motivates viewers to visit a companion web site for more detailed information. The display provides motivation and planning information on why and how homeowners should restore and maintain the habitat in their yards. The display is intended to be used in tabling public events. It focuses on the benefits of restoration to a homeowner: aesthetics; improved habitat; water quality and household economic benefit. The web site URL is http://www.vonsalza.com/akcr/ywh/index.html.

Keywords: Environmental Education, Habitat Restoration
Geographic Location: Bridlemile Neighborhood, Southwest Portland, OR
Partners and Sponsors: Bureau of Environmental Services, City of Portland, OR

Newberry, Kerry

Leadership in Ecology, Culture & Learning program, Portland State University
3556 SE Main Street, Portland, OR 97214
Phone: (703)489-1782, Email: kanewb@aol.com

Public Education: From Vine to Table, *An Ethnographic Study of Sustainability in the Willamette Valley*

The purpose of this research project was to apply an ethnographic lens to the relationship between Willamette Valley grape growers/winemakers, wine consumers, and wine retail. How do each of the above cultures identify with the concept of environmental, economical and social sustainability as related to viticulture, consumption, and marketing. Utilizing the tools of Ethnography, I strived to create a new way to envision ecological, economical, and social sustainability, through the people, story, and place of wine.
Why wine? Two recent films, Mondovino and Sideways, featured wine as a main character, captivating audiences internationally. One film focused on the globalization of the wine industry, while the other captured the romance and story found through this elixir. Without a doubt, wine engages consumers through story, romance, and taste. Packaged in eloquent, shiny bottles, the soil and roots from whence it came is oft forgotten. Wine is an agricultural product, adrift in the tumultuous sea of small family farms, changing land-use planning practices and policy, globalization, and homogenization. Three core research questions guided this study: defining sustainability; engaging and educating the public on sustainability in alternative ways; and "the triple bottom line" in the Oregon Wine Industry. Will the Oregon Wine Industry brand itself through John Elkington's triple bottom line philosophy (economic prosperity, environmental quality, and social justice)? Interviews focused on the environmental, social equity, and economical aspects of the industry: equity (seasonal farm workers benefits and health insurance); environmental (sustainable viticulture, chemical use, watershed restoration, third-party certification); economics (small businesses/small farms, land-use laws and politics (Measure 37), and marketing).

Keywords: Economics, Land/Watershed Management, Sustainable Development
Time period: November 2004 - August 2005
Geographic Location: Willamette Valley, specifically vineyards near Dundee & Newberg, OR
Partners and Sponsors: Culminating Master's Research project for Portland State University, LECL (Leadership in Ecology, Culture & Learning) program.
Publications: Photography & vignette exhibits at Vino Paradiso Wine Bar (Pearl District) Aug 2005 & Ecotrust, Oct 2005

Norred, Jon[1] and Chang, Heejun[2]

Department of Geography, Portland State University
1721 SW Broadway, Portland OR 97207
[1]jnorred@pdx.edu
[2]changh@pdx.edu

Seasonal Variation in Stream Response to Storm Events in Fanno Creek

Highly urbanized watersheds in the Portland metropolitan area are particularly susceptible to pollutant loading changes associated with seasonal variations in stream response. Seasonal variations in the magnitude and intensity of storms in the region are associated with the flushing and dilution effects on water quality constituents markedly demonstrated in these urbanized areas. As an ongoing investigation we monitored the changes in stream response to these seasonal variations at the storm event scale from two USGS monitoring sites in Fanno Creek. We analyzed wet and dry season differences in discharge, dissolved oxygen (DO), temperature, and conductivity for Fanno at the Durham site for the 2005-2006 water year. We also analyzed nitrates, orthophosphates, and ammonium nitrogen for samples collected at the 56th avenue site during 2005 spring and fall storm events. This data was analyzed for changes associated with the magnitude and duration of precipitation for specific storm events throughout the course of the study period. Changes in constituent levels associated with changes in flow and the hysteresis effects of different constituents provide insight into the potential sources of these constituents in the stream. Further investigation into the source of these constituent loads may lead to a greater understanding of the key contributors to pollutant loading in these urban streams and, as such, lead to a greater understanding of pollutant contributors in the urban environment and how they may be affected by seasonal variations in storm events.

Keywords: Hydrology, Land/Watershed Management, Water Quality
Time period: 2005
Geographic Location: Fanno Creek, Washington County, City of Portland, OR
Partners and Sponsors: BES, City of Portland; Clean Water Services; Portland State University

O'Day, Terry[1]; O'Day, Steve; Hastay, Ellen; Gundersen, Deke[2]; Shipp, Greg; Reeder, Xander; Rhodes, Amanda; Rutledge, Amanda; Propheter, Megan; Maldonado, Madaline

Environmental Studies Department, Pacific University
2043 College Way, Forest Grove, OR 97116
[1]Phone: (503) 352 2765, Email: odayt@pacificu.edu
[2]Phone: (503) 352-2276, Email: deke@pacificu.edu

The B-Street Sustainability Project

The Pacific University Environmental Studies Program has initiated a demonstration farm (B-Street Farm, Forest Grove OR), that will serve as a connector between Pacific University faculty and students, community members, and local farmers. Through a website, printed information, active gardens, classes and workshops, we will provide information, demonstration, and instruction on sustainable local food production, especially geared towards urban gardening. This project involves a systemized collection of biomass materials from Pacific University (kitchen compost, grass clippings) and converts them to compost for use in growing food that will be available to the local community through CSA or Farmers Market. Students and community members will be able to access the site via a trail system that connects this project and other projects by the city, Metro, and Pacific University. Local k-12 schools will use the site as a fieldwork site. In addition, we intend to help support the development of a local Farmers Market by providing growing space for use as a business incubator to Adelente Mujares, an organization that is directly involved with the planning and implementation stages of the market. Though still in its infancy, we envision a resource that will be able to provide information on several topics including planting dates, connections to school lunch programs, amounts to plant for family consumption, varieties of food plants that succeed in this area, development of locally adapted plant breeds, backyard chickens for egg production, beekeeping, development of cooperative neighborhood food-producing networks, and development of sustainable eco-agriculture systems.

Keywords: Environmental Education, Land Use Planning, Plant Ecology
Time period: September 2004 - present
Geographic Location: Forest Grove, OR
Partners and Sponsors: Pacific University, The City of Forest Grove, Adelente Mujares, Forest Grove School District, Metro

Opila, Frank and Willis, Pat

Jackson Bottom Wetlands Preserve
2600 SW Hillsboro Hwy. Hillsboro, OR 97123
Phone: (503) 681-6419, Fax: (503) 681-6277, Email: franko@ci.hillsboro.or.us

Comparison of Water Quality Data From the Tualatin River and a Wetland Floodplain

Jackson Bottom Wetlands Preserve is located in the 3000-acre Jackson Bottom floodplain of the Tualatin River. A restored wetland marsh was constructed in the Preserve in 1998 to provide open water habitat for ducks and other water birds. Two water quality monitoring stations are deployed at the Preserve: in the Tualatin River (River Mile 44.4) and in the restored wetland marsh. Data are being collected for education and research activities, along with agency use for resource management. Monitoring probes measure the following parameters every hour: temperature, pH, dissolved oxygen (DO), specific conductance, turbidity and water level. Seasonally, measurements in the Tualatin River show a strong inverse relationship between DO and temperature. This is because the solubility of a gas in water is a strong function of temperature. In the wetland marsh, there is little or no correlation between DO and temperature. This indicates that there are processes other than solubility that are influencing the DO budget in the wetland. The wetland data show significant diurnal cycles for both DO and pH. This is a result of the photosynthesis of algae and aquatic plants, which are sustained by the nutrient load in the wetland. Photosynthesis is apparent even in the winter months due to the presence of phytoplankton. As expected, the DO levels drop as aerobic decomposition occurs. Since there is such a strong solubility signal in the river, we can conclude that the processes that produce and consume DO in the wetland are less important in the river.

Keywords: Water Quality, Hydrology, Environmental Education
Time period: June 2004 – 2006
Geographic Location: Jackson Bottom Wetlands Preserve, Hillsboro, OR; Tualatin River (monitoring at river mile 44.4), Washington County, OR
Partners and Sponsors: Clean Water Services, United States Geological Survey, Oregon Water Resources Department, PSU Environmental Sciences & Resources, PCC Department of Engineering, Tualatin River Watershed Council, Oregon Community Foundation (Tualatin Valley Water Quality Endowment Fund), Spirit Mountain Community Fund, Metro Greenspaces Grant Program, US Fish and Wildlife Service, Intel

Ory, Jill

Clean Water Services
2550 SW Hillsboro Hwy, Hillsboro, OR 97123
Phone: (503) 681-3638; Email: oryj@cleanwaterservices.org

The Tree Planting Challenge

The Healthy Streams Plan, the newly-adopted Watershed Management plan for the Tualatin Watershed, has set a target of two million trees and shrubs planted along stream corridors of the watershed over the next twenty years. In order to achieve this goal, Clean Water Services, with only two full-time staff dedicated to tree-planting projects, has solicited the assistance of the cities and citizens within our watershed, as well as Washington County, and non-profit organizations. The program works by providing incentives to jurisdictions to undertake planting, including free trees and technical assistance. Clean Water Services works with local nurseries to grow plants, stocks them at our stream operations center, takes plant orders from jurisdictions, and provides the plants during each planting season. The cities conduct site preparation such as invasive species removal and post-project maintenance. In order to meet these targets, Clean Water Services set achievable yearly goals, by dividing up one million trees based on the city's population, and dividing this number across twenty years. Targets are set lower in initial years and ramp up as time passes. Clean Water Services, itself, will plant the other one million trees, also over the next twenty years. Through this collaborative approach, not only can we stretch dollars into longer planted corridors, but we can foster stewardship within individual cities. The ultimate goal is to vastly increase the miles of stream corridor planted to improve fish and wildlife habitat and water quality across the watershed.

Keywords: Habitat Restoration, Land/Watershed Management, Land Use Planning
Time period: 2005-2025
Geographic Location: The Tualatin River Watershed, OR
Partners and Sponsors: Cities within Tualatin Basin, Washington County, SOLV, Friends of Trees, others TBD

Page, Leah Nevada[1] and Kling, David[2]

Department of Economics, Reed College
3203 SE Woodstock Blvd., Portland, OR 97202
[1]Email: pagel@reed.edu
[2]Email: klingd@reed.edu

Economic Benefits of Riparian Restoration: Portland's Fanno Creek Watershed

Hedonic studies are the most popular statistical method in the economics literature for assessing whether proximity to a natural resource is capitalized into a home's sale price. There are, however, significant challenges involved in using this approach to estimate people's "willingness to pay" for natural resources. After reviewing the literature on spatially dependent variables, we estimate the economic benefits of restoration projects using data on home sales in the Fanno Creek area of Southwest Portland, Oregon.

Keywords: Economics, Environmental Social Sciences, Land Use Planning
Partners and Sponsors: Professor Noelwah Netusil (netusil@reed.edu)

Parra, Jeremy[1] and George, Linda[2]

[1]Department of Environmental Sciences/Physics
Portland State University
1719 SW 10th Ave., Rm 246
Portland, OR 97201
Phone: (503) 725-8003, Email: parra@pdx.edu

[2]Center for Science Education
Portland State University
1719 SW 10th Ave., Rm 218
Portland, OR 97201

Increasing the Utility of Ubiquitous Urban Rooftop Meteorological Measurements for Air Pollution Modeling

Accurate assessment of the transport and dispersion of pollutants within the urban boundary layer is needed to meaningfully predict air quality at the city and neighborhood scale. Rooftop meteorological monitoring networks measuring wind parameters and pollution concentration exist in many cities, including Portland, Oregon. However, because of the local scale turbulence characteristic of urban centers it is rare that wind measurements, vital to an accurate dispersion model, are directly representative of a spatial extent greater than the immediate surrounding. Because of this, air pollution models typically use wind measurements made well outside of the city and attempt to extrapolate values for the city domain. These extrapolations make many approximations in matching boundary condition far from measurement sites resulting in large uncertainties. Our approach is to develop a methodology to utilize meteorological measurements made within the city; transforming the wind measurements to a representative height useful for regional and local scale air quality modeling. In this spirit we apply the work of Weiringa (1996) to derive "potential" wind velocities which may be extrapolated to give the wind velocity field for a 5 km region about the measurement site. The transformation depends on the roughness length of the measurement station and the zero plane displacement height. These parameters must be calculated, and the methods for doing so vary in the literature. The results of several examples of this work within the Portland, OR region are used to evaluate the effectiveness of such transformations.

Keywords: Air Quality
Timeline: 2003-2005
Geographic Location: Portland, Oregon Metro Area
Partners: F.U.S.E Project (www.fuse.pdx.edu); NSF

Pence, Michael L.

OrganiSyn Consulting
Lake Oswego, OR 97035
Phone:(503) 260-8877, Email: michael@organisyn.com

Performing Real-Time Data Analysis for Maximizing Field Study Data Collection

In the summer of 2004, Portland Metro conducted a preliminary hyperspectral analysis study, at Cooper Mountain greenspace, to gather plant spectral reflectance signatures. We collected spectral reflectance signature data with a commercial spectroradiometer and also collected supporting metadata (images, GPS, notes). While collecting data in the field, we quickly learned that an important part of the study included data analysis during collection, or at a minimum, data analysis at the end of the day, to assess data quality. Knowing data quality was critical to research goals and to help plan the next days data collection activities. Timing is critical to get a few precious hours in the field during optimal conditions (daily solar maximum and cloudless skies) to gather spectral signatures, and near real-time data analysis is essential and cost-effective for maximal field data collection. The next efficient technological step is to transmit the data to a processing facility via wireless internet connection from field hardware for real-time analysis and direct communications to the field on data collection success. During processing, raw and processed data could then be directly uploaded to a internet-based geographic archive for future use.

Keywords: Conservation Biology, Habitat Restoration, Land Use Planning
Time period: 2003 - 2006
Geographic Location: Cooper Mountain, Metro Greenspace, Washington County, OR (Long=-122.87722 Lat.=45.44686)
Publications:
Pence, M., J. Budhabhatti, and R. Garono. Defining Invasive Plant Species Spectral Signatures for Mapping of Metro Greenspaces. Urban Ecology and Conservation Symposium. 2005. http://www.organisyn.com/solutions/biomap/metro/index.html

Pennington, Toni[1] and Sytsma, Mark D.[2]

Center for Lakes & Reservoirs, Environmental Sciences & Resources Program
Portland State University
PO Box 751-ESR, Portland, OR 97207-0751
[1]Phone: (503) 725-9075, Fax: (503) 725-3834, Email: toni@pdx.edu
[2]Phone: (503) 725-3833, Fax: (503) 725-3834, Email: sytsmam@pdx.edu

Biology of *Egeria densa* in Western Waterways

Invasion of lakes and reservoirs by non-native submersed aquatic plants degrades water quality, limits navigability, and is aesthetically displeasing. *Egeria densa* is one of the most problematic aquatic plants in the Sacramento-San Joaquin Delta of California. The purpose of this ongoing research is to improve the understanding of the life history of *E. densa* in an effort to improve management efficacy in the Delta. Growth and photosynthetic response to light were measured monthly in Disappointment Slough in the Delta beginning December 2003. Photosynthetic response to light was determined by incubating plant tips in 300-ml bottles at five light levels using neutral density shade cloth. Changes in pH and dissolved oxygen concentration were measured before and after 4h at ambient surface water temperature. Bicarbonate (HCO_3^-) use by *E. densa* was suggested by growth at pH of 10.18 after 4h incubation. To date, maximum photosynthetic rate was observed summer 2004 at ~6 mg $O_2 \cdot$ mg $DW^{-1} \cdot h^{-1}$ when surface water was 25C. Minimum photosynthetic rate was observed January 2004 at 1.2 mg $O_2 \cdot$ mg $DW^{-1} \cdot h^{-1}$ when surface water was 9.2C. Photosynthetic efficiency (α) was positively correlated with %N in plant tips ($p = 0.008$) and negatively correlated with light compensation (Ik) ($p = 0.02$). Growth rates were determined by tagging plants and measuring changes in apical growth and stem elongation after approximately three weeks. Average maximum apical growth of 0.7 (±0.09 SE) cm d^{-1} and stem elongation of 0.25 (±0.04 SE) cm d^{-1} was observed in April 2004 when water temperature was 23C.

Keywords: Plant Ecology, Water Quality, Habitat Restoration, Hydrology
Time period: December 2003 to June 2005
Geographic Location: Sacramento-San Joaquin Delta, California
Partners and Sponsors: California Bay-Delta Authority, USDA-APHIS

Pennington, Toni[1]; Gilbey, David[2]; Rosenkranz, Mark[3]

Oregon Lakes Association
OLA, PO Box 345, Portland, OR 97207

[1]Portland State University
Center for Lakes and Reservoirs
1025 Harrison St, Portland OR 97207
Phone: (503) 725-9075
Email: toni@pdx.edu

[2]City of Lake Oswego
Phone: (503) 675-3999
Email: dgilbey@ci.oswego.or.us

[3]Lake Oswego Corporation
Phone: (503) 636-1422 x6
Email: rosenkranz@lakecorp.com

Oregon Lakes Association: A Voice for Quiet Waters

The Oregon Lakes Association (OLA) is the Oregon affiliate of the North American Lake Management Society (NALMS). OLA was founded in 1988, and promotes the understanding, protection, and thoughtful management of lake and watershed ecosystems in Oregon. Members of the OLA have one thing in common; they have a great interest in lakes. OLA members share knowledge, ideas, and experiences in a group of people with diverse backgrounds. Our members are lakeshore homeowners, scientists, businesses, agencies, entrepreneurs, anglers, boaters, and consultants. They write articles for our newsletter, *Lake Wise*, testify at public hearings, and look forward to getting their hands wet. For more information please check out our website at: www.oregonlakes.org, or email us at membership@oregonlakes.org.

Keywords: Environmental Education, Land/Watershed Management, Water Quality
Time period: Not Applicable (presentation is informational poster only)
Geographic Location: Oregon
Partners and Sponsors: NALMS Chapter
Publications: *Lake Wise*, Quarterly Members Letter

Perry, Kevin[1] and Rauscher, Tracy

Bureau of Environmental Services, City of Portland
1120 SW 5th Ave. Rm 1000, Portland, OR 97204
[1]Phone: (503) 823-7090, Email: kevinp@bes.ci.portland.or.us

Portland's Green Street Stormwater Solutions

Since 2003, The City of Portland's Sustainable Stormwater Management Group has designed, constructed, and monitored a number of innovative Green Street retrofit projects throughout the city. Each project is designed to capture street stormwater runoff in landscape areas where the water is filtered, slowed, and allowed to infiltrate into the ground. Three of these green street projects are particularly unique in that they each illustrate different ways in managing street runoff. The NE Siskiyou Green Street (2003) utilizes a pair of stormwater curb extensions to capture street runoff in a residential setting. The 12th Avenue Green Street (2005) illustrates an urban example of street stormwater planters that capture street runoff "behind the curb" maintaining on-street parking. Lastly, the Glencoe Elementary School Raingarden (2003) showcases how a large "unused" space can be transformed into viable, artistic, and educational stormwater management facility. City of Portland staff continually monitors the performance of each of these Green Street projects. A series of simulated flow tests have shown that these Green Street projects have the potential to significantly reduce both the peak volume and flow in large intensity storm events. Each project is planted with low-growing, evergreen plants in order to reduce facility maintenance. The majority of the plants species are native, however some adaptable ornamental species were also used for aesthetic interest. The careful design of these projects has proven that Green Street can provide not only water quality and flow/volume reduction benefits, but they also can enhance the livability and aesthetics of our streets.

Keywords: Sustainable Development, Water Quality, Transportation
Geographic Location: Willamette River Watershed – NE, SE, and SW Portland, OR
Partners and Sponsors: Portland Office of Transportation, Portland Parks and Recreation, Portland Public Schools

Poracsky, Joseph and Banis, David

Center for Spatial Analysis & Research (CSAR)
Geography Department, Portland State University
PO Box 751, Portland, OR 97207
Phone: (503) 725-3158, Fax: (503) 725-3166, Email: maps@pdx.edu

Portland's Urban Forest Canopy and Street Trees

Urban forest canopy mapping has been performed for a number of U.S. cities, but little has been done to evaluate the Street Tree Component (STC) of the urban forest canopy. This study sought to map and analyze STC of canopy in Portland, OR based on a combination of remote sensing data and field work. A wide difference in mean values were found for total canopy, ranging from 4.7% in commercial / industrial areas to 29.2% in residential areas. The difference in mean value for the STC of the canopy was much narrower – only varying from 16.6% in residential areas to 23.7% in commercial / industrial areas. The mean STC for the city as a whole was 17.2%. Two key spatial patterns were identified. First, street tree canopy as a percent of area follows a generally east-west linear gradient, with lower values to the east and higher values to the west. Second, street trees as a component of the total canopy can be conceptualized as a surface with an inverted-U shape, with higher values in the Inner Eastside and lower values to the east and to the west. While this study provides an overview of the role of street trees in the urban forest canopy and some intriguing preliminary results, more detailed data and analysis will be needed to fill in details.

Keywords: Land Use Planning, Plant Ecology, Transportation
Time period: 2002
Geographic Location: City of Portland, OR
Partners and Sponsors: U.S. Fish and Wildlife Service, Oregon Department of Forestry (Urban & Community Forestry Program), Portland General Electric
Publications:
Poracsky, Joseph and David Banis. 2005. *Street Trees in the Urban Forest Canopy: Portland, Oregon.* Project Report: Center for Spatial Analysis & Research (CSAR), Geography Department, Portland State University; 31 pp. plus Appendices.

Scheuer, Kif

School of Natural Resources & Environment, University of Michigan
440 Church St., Ann Arbor, MI 48109
Phone: (734) 483-9043, Email: cscheuer@umich.edu

Adoption of Green Practices Among Residential Builders: The Role of Familiarity

During summer 2005 I began to study psychological factors in the adoption of green building practices among residential builders – in particular the role of familiarity (builders' comfort and confidence with information). To date I have surveyed 48 builders in Michigan and Oregon with a range of experience with, and commitment to, green building. Survey questions include specific green practices builders are familiar with, information sources they rely on in their work, the concerns they have about green building and demographic information about their building practice. Beginning with the Oregon sample (32 builders), participants also completed a cognitive mapping exercise to identify changes that could make it easier for more builders to adopt green practices. While data collection is ongoing, preliminary results are promising. Four coherent categories of familiarity with green practices have emerged – basic, advanced, integrated and environmental - reflective of comfort with qualitatively different aspects of green practices. Builders' familiarity is related to the region they practice in, the information sources they rely on and the concerns they have about green building. The characteristics of these relationships are likely to influence awareness of, and interest in, green practices. Cognitive mapping results suggest that builders recognize that changes in practice require increasing familiarity, but there is a need to increase the familiarity of the whole operational network – builders, their subcontractors, and their suppliers. Overall, these results suggest new approaches for engaging and supporting builders at different stages of involvement with green practices to increase their success at adopting green practices.

Keywords: Environmental Education, Environmental Social Sciences, Sustainable Development
Time period: Summer 2005 - ongoing
Geographic Location: Portland Oregon, Southeastern Michigan

Schmidt, Mary Ann

Healthy Waters Institute
117 SW Naito Parkway, Portland, OR 97204
Phone: (503) 222-9091 x20, Fax: (503) 222-9187, Email: maryann@ortrout.org, Website: http://www.healthywatersinstitute.org

Working to Engage Oregon Students with Their Home Waters through Community-Based Inquiry Science

Healthy Waters Institute (HWI) is a student-staffed research and teaching institute with a mission to improve education by working with communities to engage all students with their home waters. The ultimate goal is to reach every student in Oregon and to return health to the state's waters while developing stewardship in future generations of Oregonians. Services offered by HWI include: Support from a locally based Regional Education Coordinator, Biannual healthy waters journal, Recruiting and training volunteers, Reimbursement for transportation and substitutes, Loaner equipment for measuring and monitoring, Listserv of active and committed stakeholders in our pilot watersheds and statewide, and Core programs such as Salmon Watch. In Salmon Watch, the Institute's most popular program, students identify salmon as an indicator species of water health and determine whether an accessible reach of a local, salmon-bearing river is healthy enough to support spawning salmon. By testing the water quality, determining the presence—or lack of—pollution tolerant and intolerant macroinvertebrates, examining the riparian zone's health, and discussing fish biology with a professional, the students ascertain the health of the river.

Keywords: Environmental Education, Habitat Restoration, Water Quality
Geographic Location: Throughout Oregon, with particular focus on four pilot watersheds (Johnson Creek, Marys River, Upper Deschutes, and Bear Creek (Medford)
Partners and Sponsors: Oregon Trout and Watershed Councils (see listed above)
Publications: *Healthy Waters* journal

Scholz, Nat[1]; McCarthy, Sarah[2]; McIntyre, Jenifer; Labenia, Jana; Laetz, Cathy; Incardona, John; Myers, Mark; Collier, Tracy

Ecotoxicology and Environmental Fish Health Program
NOAA Fisheries, Northwest Fisheries Science Center
2725 Montlake Blvd. E., Seattle, WA 98112
[1]Email: nathaniel.scholz@noaa.gov
[2]Email: sarah.mccarthy@noaa.gov

NOAA Research on Urban Stormwater Runoff and Salmon Health

Urbanization is posing an increasing threat to aquatic species in the Pacific Northwest. Storm events mobile a wide variety of pollutants in urban watersheds and transport these chemical contaminants to surface waters that provide habitat for salmon and other species of fish. Prominent examples of non-point source pollutants include current use pesticides, heavy metals, and polycyclic aromatic hyrdrocarbons (PAHs). The effects of these chemicals on salmon health, individually and in complex mixtures, are poorly understood. This uncertainty poses challenges for the management of vulnerable fish populations, including threatened or endangered species. This presentation will highlight recent research at the Northwest Fisheries Science Center (sponsored by the NOAA Coastal Storms Program and the NOAA Coastal Services Center) on the ecotoxicology of urban stormwater. Specific examples will include the impacts of dissolved copper on fish sensory systems, the effects of insecticides on salmon brain chemistry and behavior, and the developmental toxicity of PAHs to the cardiovascular system of fish embryos and larvae. We will also present evidence for widespread die-offs among salmon returning to spawn in urban creeks, as well as high rates of developmental defects in salmon embryos reared in urban stream water.

Keywords: Conservation Biology, Habitat Restoration, Water Quality
Time period of study: 2002 - present
Geographic location: Pacific Northwest
Partners and sponsors: NOAA Coastal Storms Program, NOAA Coastal Services Center, U.S. Fish and Wildlife Service National Contaminants Program, Seattle Public Utilities
Publications: see http://www.nwfsc.noaa.gov/research/divisions/ec/ecotox/

Senkyr, K. Lauren

Lewis & Clark College
0615 SW Palatine Hill Rd, Portland, OR 97219
Phone: (440) 364-0960, (503) 452-7837, Email: senkyr@lclark.edu

Riparian Habitat Analysis: Science and Policy

I assessed the wildlife habitat of an ephemeral stream and the adjacent forested ravine that run through Lewis & Clark College campus. As an urban riparian habitat the site is protected as an environmental zone under Oregon's Goal 5 and as Class 1 and 2 riparian habitat under the new Metro ordinance, Nature in Neighborhoods. In order to determine the quality of the habitat and draw conclusions comparable to Metro's inventories, I performed Portland Parks and Recreation's "Natural Resources Inventory" protocol for wildlife habitat surveying. The goals of this assessment were three-fold: 1) to characterize the condition of this riparian habitat, 2) to evaluate the scientific merit of the inventories and surveys used by Metro to monitor urban riparian habitat, and 3) to evaluate the policy that protects this habitat. Nature in Neighborhoods succeeds in conserving this habitat, but is ineffective at maintaining its integrity and ensuring its ecological functioning. The most significant findings of this study are that invasive and other nonnative species dominate all but one strata of the forest, English ivy is the only species found in every plot inventoried, and many ornamental non-native species are regenerating in unlandscaped portions of the ravine. From these and other findings, I propose a restoration plan involving removal of nonnative species, revegetation of the stream banks, and campus-wide management practices to conserve the native vegetation and increase high quality wildlife habitat.

Keywords: Environmental Policy, Habitat Restoration, Land/Watershed Management,
Time period: Fall 2005
Geographic Location: Willamette River tributary, Lewis & Clark College campus, SW Portland, OR

Simkanin, Christina[1]; Noble, Monaca; Davidson, Ian; Sytsma, Mark D.

Aquatic Bioinvasion Research and Policy Institute (ABRPI)
Environmental Sciences & Resources Program, Portland State University
PO Box 751, Portland, OR 97207
[1]Phone: (503) 725-8105, Email: simkanin@pdx.edu

Assessing Shipping Vectors of Aquatic Non-indigenous Species to the Lower Columbia River

Introduced species are affecting biological systems around the world causing a wide range of economic and ecological damage. Within aquatic systems, commercial shipping is the primary vector of non-indigenous species (NIS) at a global scale via two sub-vectors; ballast water and hull fouling. Furthermore, these ship-mediated translocations of species are often brought into close proximity with urban environments where ports and centers of trade are focused. Effective strategies to reduce the spread of NIS via ballast water have been developed through research and legislation but similar efforts for the hull fouling vector are not as prominent. The ABRPI is investigating shipping vectors in the Lower Columbia River (LCR) in a number of projects. Firstly, a ballast water pilot project is examining rates of compliance between federal and state programs in an effort to improve data quality and quantity, as well as monitoring ballast water management in Oregon ports. Secondly, ballast water sampling has been carried out to examine the survivorship, and possibility of introduction, of coastal zooplankton on voyages from other freshwater ports (e.g. Stockton). Thirdly, the threat of NIS introductions via the hull fouling vector has been examined through analysis of hulls on dry dock and the colonizable surface areas of vessels arriving to LCR ports. Overall, the data show that the threat of ship-mediated introductions to the Columbia River is lower compared to other west coast ports, not because of reduced propagule supply, but because of the system's decreased environmental receptiveness to marine propagules.

Keywords: Animal Ecology, Environmental Policy, Transportation.
Time period: January - December 2005
Geographic Location: Columbia River, OR
Partners and Sponsors: United States Coast Guard, Pacific States Marine Fisheries Commission and California State Lands Commission.

Sinclair, Marcia

Willamette Partnership
105 High Street SE, Salem, OR 97301-3667
Phone: (503) 661-6152, Fax: (503) 669-2912, Email: Marcia@willamettepartnership.org
Website: www.willamettepartnership.org

Building an Ecosystem Marketplace for the Willamette River Basin

The Willamette River Basin is home to most Oregonians and their largest communities and industries. To reverse serious declines in the basin's ecological function, citizens must find efficient cost-effective methods of improving water quality and restoring critical habitats that support fish and wildlife. The Willamette Partnership is developing an Ecosystem Marketplace, a credit trading and banking program that achieves ecosystem benefits more cost-effectively and quickly than is possible using conventional regulatory and voluntary approaches. The initial credit trading system is focused on water temperature standards for the Willamette. Regulated parties such as industries and municipal waste water managers are required to keep discharges entering the water system below specific temperature thresholds. Managing this individually would require each to invest in expensive local cooling equipment. The Marketplace provides a mechanism for these permit holders to buy credits to restore the river's own cooling system through floodplain and riparian restoration. This allows pooled resources from several permit holders to be invested in significant and high priority ecological restoration at critical locations on a coordinated schedule to benefit many species. While there are established credit-trading systems--carbon sequestration for example--there is currently no mechanism for broad-scale, multi-credit trading. The Willamette Partnership envisions a banking and trading system that brokers exchanges between landowners with high quality habitat and regulated parties seeking ecosystem investments. Credit purchase will not be limited to regulated parties but will provide an excellent opportunity for private financial investment. Credits fund restoration work with the highest potential for significant ecological results.

Keywords: Economics, Habitat Restoration, Water Quality
Time period: 2006-2009
Geographic Location: Willamette River main stem and tributaries, Willamette River Basin, OR
Partners and Sponsors: U.S. Environmental Protection Agency, Governor Kulongowski, Confederated Tribes of Grand Ronde, Clean Water Services, Associated Oregon Industries, Cities of Albany, Eugene, Salem, and Portland, Willamette Riverkeeper, Defenders of Wildlife, Association of Clean Water Agencies, Oregon DEQ, Oregon Business Council, Oregon Business Association, Oregon Environmental Council, SOLV, The Conifer Group, University of Oregon Institute for Sustainable Development, Oregon Association of Conservation Districts, OSU, PSU, Heritage Seedlings, Inc., Wildwood Mahonia, American Heritage Rivers

Smith, Sarah B.[1] and Murphy, Michael T.

Department of Biology, Portland State University
P.O. Box 751, Portland, OR 97207
[1]Phone: (503) 725-8501, Email: sbsmith@pdx.edu

The Source-sink Dynamics of Spotted Towhees in Urban Greenspaces

For two breeding seasons, we studied several color-banded populations of Spotted Towhees (*Pipilo maculatus*) in greenspaces ranging in size from 1 to 24 hectares within the Tryon Creek Watershed in Portland, Oregon. Our goal has been to determine whether local populations in these urban habitat fragments are self-sustaining (i.e. source populations) or if they can only be maintained by immigration from outside sources (i.e. sink populations). Determining whether a habitat is a source or a sink requires measurements of reproductive output and adult and juvenile survival. In 2004 and 2005 we monitored a total of 231 nests, and banded a total of 227 adults and 372 nestlings. Our preliminary analyses of the source-sink dynamics within these greenspaces suggests that parks in the 10-11 hectare range are sinks, while larger parks (>15 hectares) are sources, and that this result is primarily due to decreased survival in the smaller greenspaces. An additional 2 years of reproductive success and survival data, and additional work in small (1-2 hectare) sites will help elucidate the significance of these findings.

Keywords: Animal Ecology, Conservation Biology, Wildlife Biology
Time period: April 2004-August 2007
Geographic Location: Tryon Creek Watershed, City of Portland, OR
Partners and Sponsors: We have received funding from a USFW/Metro Greenspaces Grant and the Portland State University Forbes-Lea Research Fund

Steiner, Claire[1]; Holcombe, Candice; Martin, Kelley; Sadiq, Ali; Schou, Kristin

Center for Science Education, Portland State University
218 Science Building 2, Portland, OR 97207
[1]Phone: (614) 296-2928, Email: csteiner@pdx.edu

Effect of Urbanization on Soil Temperatures in the Portland Metropolitan Area

The urban heat island effect has been studied extensively in relation to air temperature, but few researchers have examined the effect of urbanization on soil temperatures. Increased soil temperatures in urban areas can adversely affect root growth, soil organism productivity, and inorganic chemical processes. This study examines nighttime surface-level soil temperatures in the Portland, Oregon, metropolitan region in relation both to distance from the Portland urban center and to local levels of urbanization at the measurement sites. Measurements were taken in the early morning (predawn) hours of November 19, 2005. Soil and air temperatures were measured at one-mile increments along a 15-mile transect beginning in the Portland urban core and extending south/southeast to approximately three miles beyond the urban growth boundary. The study found a general decline in soil temperatures both with distance from the urban center and with declining levels of impervious surfaces associated with local urbanization. Soil temperatures outside of the urban growth boundary were found to be an average of 2.4 degrees Celsius lower than coinciding soil temperatures at the urban core. Along the urban-to-rural transect, soil temperatures correlated more strongly with local levels of urbanization than with distance from the urban core. This study shows that urbanization, both local and regional, influences surface-level soil temperatures along this transect.

Keywords: Soil Science, Plant Ecology, Sustainable Development
Time period: Early morning November 19, 2005
Geographic location: Southeastern portion of Portland metropolitan region (15-mile transect beginning in urban center and ending three miles beyond Urban Growth Boundary), OR
Partners and Sponsors: Study designed and conducted under the guidance of Dr. Linda George, PSU Center for Science Education

Stevens, Wendy[1] and Archibald, Wendy[2]

[1]Environmental Science & Resources Program
Portland State University
PO Box 751, Portland, OR 97207
Phone: (503) 285-5165, Email: wendys@pdx.edu

[2]Portland Public Schools
Winterhaven Middle School
3830 SE 14th Ave, Portland, OR 97202
Phone: (503) 916-6200, Email: warchibald@pps.k12.or.us

School-Community Partnerships in Conservation: Restoration and Monitoring of Forest Habitat at Oaks Bottom Wildlife Refuge by Winterhaven Middle School

Eighth grade students at Winterhaven middle school have been working with Portland Parks Natural Resources Division to restore and study a hectare plot of mixed deciduous forest in Oaks Bottom Wildlife Refuge. The students presenting have personally worked on this plot for three years, starting as 6th graders as part of their science curriculum. They have visited the same plot locations once a month, for a class period. Each visit they completed a different aspect of site restoration and monitoring, with a total of eight site visits each year. Each activity connected to an aspect of their science curriculum. Their presentation reports on what they have done and how their work has affected the forest habitat and wildlife. They also share how this experience has benefited them as students and citizens, as well as some challenges in using the environment as a classroom working on real community needs.

Keywords: Conservation Biology, Environmental Education, Habitat Restoration
Time period: Fall 2003 - Winter 2006
Geographic Location: Oaks Bottom Wildlife Refuge, Portland
Partners and Sponsors: Portland Parks Natural Resources Division and Portland Public Schools

Stewart, Elaine[1] and Kimpo, Angie

Metro Parks and Greenspaces
600 NE Grand Ave, Portland 97225
[1]Phone: (503) 797-1515, Email: stewarte@metro.dst.or.us

Re-conversion of Agricultural Land to Wildlife Habitat near Forest Grove

Metro and several partners are restoring 244 acres of wetland and upland habitat on the Tualatin River floodplain south of Forest Grove under a conservation easement with the USDA Wetland Reserve Program. This site has been farmed since the early 20th century. Historical aerial photos show an intensive cropping system in place by 1934, and tile records show an extensive tile system throughout the site. A drainage ditch intercepts surface water that is then transported to either the drain tile system or directly into the river. Project elements completed to date include filling the drainage ditches to restore wetland hydrology. An outlet structure was installed where the drainage ditch exits the property to enable water level management and support native fish passage. Site preparation for planting included several rounds of cutting, spraying and tilling non-native plants. A limited area of emergent wetland and wet prairie dominated by reed canarygrass was tilled in 2004, resulting in a flush of native plants. Approximately 60 acres dominated by reed canarygrass and meadow foxtail were tilled in 2005. Remaining work includes continued weed control and establishing native plant communities. A mosaic of riparian forest, open oak woodland, mesic prairie, wet prairie, emergent wetland, and scrub/shrub wetland will provide wildlife habitat. An ambitious plant list includes a number of species collected on the site for grow-out at Metro's plant materials center. Pre- and post-project monitoring is focused on bird and plant communities in mesic prairie and oak habitats.

Keywords: Habitat Restoration, Hydrology, Plant Ecology
Time period: Site preparation and plant establishment: 1/05 - 12/11; Monitoring: 5/06 - 12/11 or longer
Geographic Location: Tualatin River floodplain between Forest Grove and Gaston, Washington County
Partners and Sponsors: USDA Natural Resource Conservation Service, Ducks Unlimited, Oregon Watershed Enhancement Board

Stewart, Elaine

Metro Parks and Greenspaces
600 NE Grand Ave, Portland 97225
Phone: (503) 797-1515, Email: stewarte@metro.dst.or.us

Comparison of Bird Communities With and Without Human Disturbance in an Urban Natural Area

Metro staff and volunteers conducted bird counts on two routes at Smith and Bybee Wetlands Natural Area in 2004 to compare bird communities in an area with a trail ("Trail Route") and an area closed to public access ("Smith Route"). The informal study was conducted to screen for differences in bird communities related to human disturbance. The routes were walked in similar habitats on alternating weeks and all birds that could be positively identified by sight or sound were recorded. During analysis, birds were grouped into nine guilds; three were selected for further analysis. Neotropical migrants: three species demonstrated no clear differences between the routes. Five species were more abundant along the Smith Route (e.g., Willow Flycatcher). Conversely, four species were more abundant along the Trail Route (e.g., Common Yellowthroat). Residents: four species were equally abundant between the routes. Along the Trail Route, five species were more abundant (e.g., American Crow). Seven species were more abundant along the Smith Route (e.g., Bushtit). Wintering birds: there were only two species for which data were sufficient to make comparisons. Dark-eyed Juncos appeared more abundant along the Trail Route and abundance of Ruby-crowned Kinglets did not appear to differ between the routes. Although these data sets were collected somewhat informally, they are suggestive that birds may vary in their response to human activity and we may be able to predict that response for certain birds in certain habitats. Further work is needed to use sound experimental methods and provide more robust comparisons.

Keywords: Animal Ecology, Land/Watershed Management, Wildlife Biology
Time period: January - December 2004
Geographic Location: Smith and Bybee Wetlands Natural Area, Portland, OR

Swanson, Sarah E.

Department of Zoology, University of Oklahoma
730 Van Vleet Oval Norman, OK 73019
Phone: (503) 367-2532, Email: sswanson@ou.edu

The Effects of English Ivy on Bark-Foraging Birds in Forest Park

English Ivy (*Hedera helix*) is a common invasive plant in urban forests including Forest Park in Portland, OR. Ivy alters the physical structure of the forest by covering the ground and climbing the trunks of trees. During the summers of 2004 and 2005 I studied the effects of ivy on birds in Forest Park using point counts and observations of bark-foraging birds. The point counts were conducted along trails in areas with different levels of ivy growth. In 2004, no difference in bird abundance or diversity was found to be associated with different levels of ivy. Counts were repeated in 2005 to see if this lack of effect would be constant between years. In 2005, foraging observations were done on bark-foraging birds including Brown Creepers (*Certhia americana*), the most commonly observed bird, and several woodpecker species (Picidae). I recorded the relative use of different foraging substrates by birds and compared that with the amount of the substrates present in the forest. When these data are analyzed, I expect to find that bark-foraging birds avoid ivy and spend less time foraging on it than they would if they chose their foraging substrate randomly. This would show that ivy reduces habitat for bark-foraging birds by making parts of it unsuitable for foraging.

Keywords: Animal Ecology, Plant Ecology, Conservation Biology
Time period: May-August 2004 and 2005
Geographic Location: Forest Park, Portland, OR
Partners and Sponsors: Portland Parks & Recreation, No Ivy League, George M. Sutton Scholarship

Thompson, Ry[1] and Studebaker, Cindy[2]

[1]Watershed Services Group
City of Portland Environmental Services
1120 SW 5th Ave, Portland, OR 97204
Phone: (503) 823-5760, Fax: (503) 823-6995
Email: ryt@bes.ci.portland.or.us

[2]Science, Fish and Wildlife Group
City of Portland Environmental Services
1120 SW 5th Ave, Portland, OR 97204
Phone: (503) 823-5482, Fax: (503) 823-6995
Email: cindys@bes.ci.portland.or.us

Off-Channel Habitat Restoration in Floodplain Wetlands: A case study from the lower Columbia Slough

The Lower Columbia Slough Off-channel Habitat Restoration Project, aka Ramsey Refugia Project, was completed in fall 2005 and restored three acres of historic tidal floodplain wetland habitat in the Ramsey Wetland Complex, a remant portion of the historic 650 acre Ramsey Lake. Floodplain wetland habitat is significantly less than what was historically present in the Lower Willamette and Lower Columbia rivers. The project principally restores hydrologic connnectivity and ecological function in the Lower Columbia River Estuary to benefit federally listed Willamette River and Columbia River salmon, and benefit other native fish and wildlife. Project objectives include: 1) Restoring hydrologic connectivity between Ramsey Lake Wetland Complex and the Lower Columbia Slough; 2) Enhancing historic floodplain wetland habitat; 3) Increasing the amount of high quality rearing and refuge habitat for juvenile Chinook, Coho and steelhead, assisting in species recovery; 4) Improving water quality; 5) Engaging the community in restoration and monitoring; and 6) Monitoring fish and wildlife communities and distribution before and after project implementation. Improvement in ecosystem function will be monitored to ensure that the project provides additional habitat to native salmon, restores hydrologic connectivity, and improves water quality.

Keywords: Fisheries, Habitat Restoration, Land/Watershed Management
Time period: 2004 - 2006
Geographic Location: Lower Columbia Slough, Portland, Oregon
Partners and Sponsors: City of Portland, Columbia Slough Watershed Council, Ducks Unlimited, Fish America Foundation, Lower Columbia River Estuary Partnership, Metro Regional Government, NOAA Restoration Center, Oregon Department of Fish and Wildlife, Port of Portland, Rhodia, Inc.

Triplett, **Stacey**

Metro, Nature in Neighborhoods
600 NE Grand Avenue, Portland, OR 97232
Phone: (503) 797-1882, Email: triplets@metro.dst.or.us

Natural Area Acquisition as Successful Strategy: Continuation of Metro's Program

In 1995, Metro passed an open space bond measure of $135.6 million dollars. To date, 8,120 acres and 74 miles of river and stream frontage has been acquired for protection, approximately 1 million trees and shrubs have been planted and 100 local park and natural area projects accomplished. In November 2006, Metro will be asking voters to support another bond measure to continue to build upon the success of the 1995 bond measure. Criteria for identifying acquisition opportunities (Regional Target Areas) for the 2006 bond included water quality, habitat value, rarity, size, restoration opportunities, connectivity, scenic resources, public access and opportunities for regional trails, greenways, and wildlife corridors. In addition to identifying Regional Target Areas, developing criteria for both local share and competitive grant monies is a key part of developing the bond measure.

Keywords: Water Quality, Habitat Restoration, Land/Watershed Management
Time Period: 1995 - 2006+
Geographic Location: Multnomah, Washington and Clackamas counties, OR

Uchiyama, Dawn

City of Portland, Bureau of Environmental Services
1120 SW 5th Ave, Rm 1000, Portland, OR 97204
Phone: (503) 823-0050, Fax: (503) 823-5344, Email: dawnu@bes.ci.portland.or.us

Actions for Watershed Health: 2005 Portland Watershed Management Plan

The City of Portland's 2005 *Watershed Management Plan* describes a comprehensive approach to improving Portland's watershed conditions using an adaptive management system to implement actions and measure progress. This is this the first time that all five Portland watersheds (Columbia Slough, Fanno Creek, Johnson Creek, Tryon Creek, and Willamette River) have been directed by a consistent framework. This plan includes strategies for whole watersheds, addressing upland conditions as well as those within the stream and river channels. Through goals, objectives, strategies and actions, the Plan describes a watershed approach to protect the best remaining resources and use both green and traditional infrastructure to improve watershed functions citywide. The watershed approach relies on integrating the activities of multiple City bureaus, and maximizing limited resources by looking for multi-objective solutions. Strategies are organized into broad categories, including aquatic and terrestrial enhancement, revegetation, stormwater management, policy and protection, education and outreach, and operations and maintenance. The strategies are mapped in the Plan to show where they can be applied throughout the city. Existing projects, programs, and areas of opportunity are identified to incorporate improvement strategies into existing city priorities. From this analysis, a Watershed Priority Areas map highlights key areas of interest for improving watershed conditions over the next 2-5 years. This list of priorities will be updated every five years to reflect monitoring results of implemented projects and continuing research and evaluation of watershed conditions.

Keywords: Land/Watershed Management, Environmental Policy
Time period: 2005 for formation of the plan; over 10 years of watershed planning work contributing to the plan content
Geographic Location: City of Portland, OR
Partners and Sponsors: other City bureaus
Publications: 2005 Portland Watershed Management Plan

Wahab, Amin[1] and Perry, Kevin[2]

City of Portland, Bureau of Environmental Services
1120 SW 5th Ave. Room 1000, Portland, OR 97204
[1]Phone: (503) 823-7895, Email: aminw@bes.ci.portland.or.us
[2]Phone: (503) 823-7090, Email: kevinp@bes.ci.portland.or.us

St. Andrew Parking Lot Impervious Area Removal and Retrofit

The Bureau of Environmental Services provided about $30k to St. Andrews Presbyterian Church and worked closely with the church to remove nearly 16,000 square-feet of impervious area to reduce stormwater runoff, improve water quality, provide community education, and to help the church reduce stormwater fees. The project was constructed during the fall and winter of 2003/04. The major elements of the project were: Removal of 16,000 square-feet of impervious area, construction of three stormwater swales, installation of native plants, and installation of asphalt speed bumps to convey stormwater runoff. Staff monitored the project closely to observe how well it functioned and achieved stated objectives. The swales contained amended soils at a depth of 8-12 inches below which laid hard clay – impeding infiltration. The swales functioned well during low intensity storms. However, during high intensity storms, considerable off-site runoff entered the parking lot swale system. Because of this increased drainage, the swales overflowed at specific points and created problems by cutting a gully through the site. It was also observed that the filter fabric used for weed suppression did not function well, slowed infiltration, and caused runoff concentration. BES and volunteers from the church made modifications in the field by redirecting flows from the upper swales into the lower and into a meandering open channel. Also, a gravel-bed channel was established where runoff had created a gully through the new soil. The site has since stabilized and seems to be functioning well. Additional modifications may be made if necessary.

Keywords: Environmental Education, Land/Watershed Management, Water Quality
Time period: 10 –15 minutes
Geographic Location: St. Andrews Presbyterian Church Parking Lot, Fanno Creek Watershed, SW Portland, OR

Webb, William C.[1] and DeLap, Jack

College of Forest Resources & Urban Ecology Program
University of Washington
[1]Phone: (206) 819-4257, Email: webb@u.washington.edu

Wildlife in the City: Use of Wildlife Injury Data to Explore Human-Wildlife Relationships

Human-wildlife relationships in cities are generally under studied. We explore the spatial relationships between urban wildlife in the city of Seattle with land cover and human demographic factors in a GIS format. Our primary dataset consists of birds and mammals treated at the region's largest wildlife rehabilitation center, Progressive Animal Welfare Society (PAWS). The entire dataset represents over 5000 individual records of birds and mammals recovered within the city of Seattle and treated at PAWS between Jan 2001 and Dec 2004. Our project asks the following questions: What is the pattern of wildlife occurrence in relation to the urban "green print", urban development, and human density? Do human demographic factors such as the intensity of vehicle traffic correlate with wildlife injury frequency? We believe that recovery data collected by wildlife rehabilitation centers such as PAWS represent an enormous untapped reservoir for improving our understanding of urban wildlife, provided that records are well kept and made accessible. In addition to the analyses mentioned above, we explore the potential for wildlife rehabilitation centers to collect, store, and distribute their data to scientists and managers. Our methods of acquiring, extracting, and use of the PAWS data serves as our primary case study to explore this potential and compares with the results of a nationwide survey of similar institutions regarding their practices of handling recovery data.

Keywords: Animal Ecology, Conservation Biology, Wildlife Biology
Time period: 2001-2004
Geographic Location: Seattle, WA
Partners and Sponsors: Urban Ecology Program, University of Washington

Wells, Steven W.[1] and Sytsma, Mark D.[2]

Center for Lakes & Reservoirs, Environmental Sciences & Resources Program
Portland State University
PO BOX 751, Portland OR 97207
[1]Phone: (503) 725-9076, Fax: (503) 725-3834, Email: sww@pdx.edu
[2]Phone: (503) 725-3833, Fax: (503) 725-3834, Email: sytsmam@pdx.edu

***Potamogeton crispus* Phenology in Blue Lake, Oregon: Implications of Timing of Turion Formation and Sprouting**

Potamogeton crispus (Curlyleaf pondweed) is a widespread, introduced plant in the western USA. It creates nuisance conditions in Blue Lake, which lies within the metropolitan area of Portland, Oregon. *P. crispus* propagates vegetatively via turions (compressed shoot apices), shoot and rhizome fragments, and sexually via seed. Turions are produced from spring to late summer. Turions sprout in fall and develop into winter-form plants that form turions the following spring. The phenology (turion formation and sprouting) of *P. crispus* in Blue Lake was investigated by sampling bimonthly using a rake and dredge over a one year period (11/6/03 to 1/11/05). Data on stem and turion mass, length, and number of leaves and buds were collected. Turions sprouted in Blue Lake, Oregon between October and the end of April. New turions were present on plants from early April through January. These data suggest that management prior to mid March may inhibit new turion formation and provide long-term benefits for *P. crispus* control in Blue Lake.

Keywords: Plant Ecology, Land/Watershed Management
Time Period: 2003-2005, 11/6/03 to 1/11/05
Geographic Location: Blue Lake, OR (N 45° 33`14" and W 122°26'19")

Williams, Dilafruz[1] and Parajuli, Pramod

EPFA/GSE, Portland State University
[1]Phone: (503) 725-4676, Email: williamsdi@pdx.edu

Urban Learning Gardens Laboratory: A Collaboration Model for K-8 Academic Performance, Health, and Multiculturalism

Since 2003, three sets of organizations have collaborated in an innovation of the "Food-based Ecological Education Design" Project (FEED) to implement the Urban Learning Gardens Laboratory in Southeast Portland: (1) The Portland International Initiative for Leadership in Ecology, Culture and Learning (PIIECL), (www.piiecl.pdx.edu), a teaching, research and community outreach graduate program at Portland State University (PSU); (2) *Community Partners*: Educational facilities including *JEAN's Urban Forest Farm* and the *Learning Gardens Laboratory*, a joint project of PSU, the City of Portland's Office of Sustainable Development, and the Bureau of Parks and Recreation; and (3) Eight *K-8 schools* within the Portland Public School District (PPS), and their teachers, parents and students. This paper will present the model of collaboration for integration of Learning Gardens in K-8 curriculum.

Keywords: Environmental Education, Sustainable Development
Time period: 2003 - 2006
Geographic Location: Southeast Portland, OR
Partners and Sponsors: PIIECL/GSE

Yeakley, J. Alan [1] and Ozawa, Connie P.[2]

Portland State University
PO Box 751, Portland, OR 97207
[1]Environmental Science & Resources, Phone: (503) 725-8040, Email: yeakley@pdx.edu
[2]School of Urban Studies & Planning

Changes in Riparian Vegetation Buffers in Three Oregon Cities from 1990 to 2002

Riparian vegetation buffer loss was investigated for three cities with contrasting local regulatory controls in urbanizing northwest Oregon. The cities examined were Hillsboro, Oregon City, and Portland, all having experienced high rates of population increase in the 1990s. Digital aerial photographs covering buffer areas within 200 m of all permanent streams for these cities were digitized at three points in time (1990, 1997, and 2002) using criteria including minimum inter-patch distance of 5m for adjacent classes and minimum patch area of $20m^2$. Cover classes were divided into vegetation areas adjacent to stream and total, as well as woody and unmanaged vegetation areas. Banding analysis was performed for these vegetation coverages for several buffer widths out to 100m from streams, and analyses were performed for both private and public ownership classes. Results for the 12 year period for adjacent tree vegetation within a 100m buffer width, Hillsboro and Oregon City had higher rates of loss (>1 percent/year), while Portland lost trees in the 100m buffer at a lower rate (<1 percent/year). At closer buffer widths, Portland losses remained proportionally lower than the other two cities. Examination of riparian patches showed that the number of distinct riparian patches decreased for all three cities, and the overall riparian edge increased, demonstrating a loss of ecological habitat integrity. These results demonstrate that vegetated riparian buffers continue to be both degraded and eliminated due to development in growing Oregon municipalities regardless of the level of regulatory protection.

Keywords: Environmental Policy, Land/Watershed Management, Plant Ecology
Time period: 1990 - 2002
Geographic Location: Portland greater metropolitan area, OR
Partners and Sponsors: Portland State University, City of Portland, Metro
Publications:

Ozawa, C. P., and J. A. Yeakley. 2004. Keeping the green edge: Stream corridor protection in the Portland metropolitan region. In: C. P. Ozawa, ed. *The Portland Edge: Challenges and Successes in Growing Communities*. Island Press, Washington, D.C., pp. 257-279.

Yeakley, J.A., Ozawa, C.P., and Hook, A.M. *In press*. Changes in Riparian Vegetation Buffers in Response to Development in Three Oregon Cities. In: Aguirre-Bravo, Celedonio, et. al. Eds. 2004. Monitoring Science and Technology Symposium: Unifying Knowledge for Sustainability in the Western Hemisphere; 2004 September 20-24; Denver, CO. Proceedings RMRS-P-000. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Zonick, Curtis A.

Metro Regional Parks and Greenspaces
600 NE Grand Avenue, Portland, OR 97232
Phone: (503) 797-1729, Email: zonickc@metro.dst.or.us

A Regional Volunteer Wildlife Monitoring Program Using Birds and Amphibians to Assess Habitat Restoration

The passage of Metro's open spaces bond measure in 1995 has lead to the protection and restoration of thousands of acres of regional habitat. Metro initiated a program to monitor selected plant and wildlife populations linked to restoration projects on many of these newly protected lands. Volunteers have played a key role in this effort. Metro selected bird and amphibians as wildlife indicators, primarily because these groups are: Relatively easy and inexpensive to track using standardized methods; Allow the safe participation of volunteers yielding reliable population data; and Facilitate an evaluation of a diverse group of resident and migratory species representing a broad array of habitat types. Beginning in 2004, Metro partnered with the Northwest Service Academy to sponsor three successive AmeriCorps positions charged with building a sustainable base of volunteer monitors. Volunteer wildlife monitors use standardized protocols refined by Metro but based upon peer-reviewed protocols such as the Habitat-based point count protocol developed by the US Forest Service for Oregon/Washington. Entering its third year, the program has been very successful at establishing a skilled and faithful volunteer base of over 70 members, and generating extremely useful and, in some cases, dramatic wildlife population data. For example, amphibian egg mass surveys have demonstrated large scale expansions of red-legged frog (*Rana aurora*) breeding populations into newly restored floodplain habitat on Metro open spaces in Washington and Multnomah Counties. Such data are guiding restoration and management by Metro scientists, as well as supporting grants for future restoration projects.

Keywords: Animal Ecology, Conservation Biology, Habitat Restoration
Geographic Location: Regional: Natural Areas in Clackamas, Multnomah and Washington County, OR
Partners and Sponsors: Northwest Service Academy, AmeriCorps, U.S. Fish and Wildlife Service

Zonick, Curtis A.

Metro Regional Parks and Greenspaces
600 NE Grand Avenue, Portland, OR 97232
Phone: (503) 797-1729, Email: zonickc@metro.dst.or.us

Development of a Regional Weed Mapping System Using False Brome (*Brachypodium sylvaticum*) as a Model

Metro Regional Parks and Greenspaces is a signatory member of a new Cooperative Weed Management Partnership (CWMP) focusing on tracking and controlling priority noxious weeds in Multnomah, Clackamas, Washington and Clark Counties. As a contributor to CWMP's Inventory and Assessment Working Group, Metro has been directing a pilot project to further a number of goals of the partnership, including: Demonstrating the utility of the Weed Information Management System Database (WIMS) as a weed tracking tool, and promoting WIMS as the standardized weed mapping system to be used by the CWMP; Developing a list of high priority regional weeds (e.g., Japanese knotweed, garlic mustard, false brome) to effectively focus limited time and resources;
and Developing a web-based clearinghouse of updated distribution maps and related information (e.g., best management practices) for high priority regional weeds. To further these goals, Metro initiated a demonstration project using WIMS to map, assess, and begin treating a recently discovered regional outbreak of false brome (*Brachypodium sylvaticum*). False brome is a perennial bunchgrass native to Africa and Eurasia that is rapidly invading coniferous forest understories in western Oregon. Metro detected false brome on property it managed along Clear Creek and later along the Clackamas River while mapping and controlling knotweed in the Clackamas Basin. Metro has been using WIMS to map false brome since 2004 helped by AmeriCorps volunteers, an intern, and a Portland State University graduate student. We report progress and future plans for mapping and controlling false brome and other high priority weeds.

Keywords: Habitat Restoration, Land/Watershed Management, Plant Ecology
Geographic Location: Regional but focused in the Clackamas Basin, OR
Partners and Sponsors: Oregon Watershed Enhancement Board, Portland State University, CWMP

AUTHOR INDEX

KEYWORD INDEX